The Builder.

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Railway Construction and Feeding.

A PERIOD of unusual immunity from accidents to railway travellers has just been terminated by the occurrence of two disasters of almost unprecedented magnitude. The Mont Cenis surface-line has been closed, and partly carried away by a landslip; and the Chester and Holyhead Railway has been the scene of a collision involving an explosion of petroleum, and causing the instant death of at least thirty-three passengers.

The latter accident, which appeals to the English public with that irresistible eloquence which, in our country, always echoes from the tomb, appears in the first instance unaccountable. Part of a luggage train is said to have become detached from the locomotive, and to have run down an incline, on which the Irish mail, rushing up at the rate of forty miles per hour, came into collision with the trucks. Notwithstanding the fact that this part of the line was on a curve, it seems inexplicable that such a collision should have occurred. What could have been the nature of the look-out kept by the engine-driver?

The shock is said to have exploded a quantity of petroleum, placed on one of the trucks at the end of the luggage-train. This statement is only intelligible in one way. The shock of the collision may have started the vessels containing the inflammable material, and thrown some of the escaping contents into the fire-box of the engine. The combustion of the remainder of the cargo would be inevitable.

We have no wish to dwell on a catastrophe that will tingle in the ears of every one that hears of it, and that is being discussed at considerable length before a coroner's jury. It is one of those events which bear on the management of traffic, but which have nothing to do with the construction of a railway. With the *Mont Cenis* slip the case is reversed.

Judging from the imperfect accounts that have as yet reached us, it seems that an *éboulement*, or land-slip, caused by violent rain, carried away both road and railway, interrupting absolutely the passage of *diligences*, and allowing only of an interrupted service for the locomotive route (even if that be not now stopped). Great complaints are made that the officials, often the worst of Continental railway servants, give no warning to the passengers, such as might allow them to halt at a place where shelter could be found, or to retrace their steps to an unbroken line of conveyance. But neither this usual French tyranny over unfortunate railway travellers, nor the interruption of the line itself, comes under the head of casualties special to the Mont Cenis line. The misfortune has overtaken the road with even more disastrous effect than that produced on the railway. Unless it be asserted that the vibration of the engine has hastened the detachment of the slip (which, if the case, can have only been a question of time), the cause of the displacement has nothing to do with railway locomotion any more than with the old traffic by diligence. It is a danger peculiar to the locality, as might be that arising from a snow-drift or an avalanche, and might beset the pedestrian or equestrian traveller with as much peril as the railway passenger.

The question, therefore, of the applicability of the system introduced by Mr. Fell, or of any other method of surmounting steep gradients, or piercing mountain passes, is only incidentally touched by the occurrence of the Mont Cenis slip. All engineers know the peculiar dangers that attend the passage of mountain chains. That which is novel to our experience is the method of so applying tractive force as to enable us to overcome the resistance offered by the power of gravitation to the ascent of lofty heights, while at the same time we adopt the same means for obviating the resistance of friction that have led to the improved travelling of the last third of a century. The resistance offered to going up hill, as far as actual lifting of load is concerned, can be diminished by no human skill: we can only apply adequate power to lift the load. The resistance offered by friction to the passage of the *diligence* or the wagon we have reduced, by the introduction of the surface line, to the 7 lb. or 8 lb. per ton common to the more level lines of railway.

The great object which has to be carried out by the various and successive improvements in internal communication which have taken place since the middle of the eighteenth century may be stated in one word as the diminution of friction. The substitution of a water surface for a land route, in the case of inland navigation,—the prevention of the deep ruts and water-logged holes that rendered our highways all but impassable in winter before the time of MacAdam,—the introduction of steel springs for carriages,—the placing of cast-iron plates to bear the wheels of the small mineral trucks of the tramways,—the iron railway introduced by Stephenson,—the subsequent step of "fishing" the rails,—the application of steel instead of iron,—and the high finish now attained both in locomotives and in some of our carriages,—are all so many steps in the reduction of running friction. Without now analysing this general expression into its constituent elements, it may be considered that a pull of seven or eight pounds weight on a well-ordered railway is more effective than that of a horse, or even of a team, under the ordinary circumstances of the winter road traffic of 1760.

The carter, or the coachman, before the date of Macadam, had indeed the knowledge that a hill was an element of difficulty. Then the opposition to progress arising from bad roads with which he had to contend was such that a gentle ascent, where the road naturally drained itself, was often preferable to a level route, where the drainage was bad. Distance, in barbarous countries, is measured rather by time than by space,—by hours rather than by leagues,—and the general travel-worthiness of a road was regarded as a question of experience, depending on soil, on undulations of the ground, on amount of mending required and lately effected, on the character of the coach-master or of the whip, rather than as a simply scientific matter.

But when once it became evident how much mastery over distance was to be attained by the use of a rigid support for the wheels of heavily-laden vehicles, more exact views as to the theory of locomotion followed as a matter of course. Thus it was constantly present to the mind of George Stephenson, in every step of his career, that while the engineer would almost annihilate friction, he was unable to elude the force of gravitation. Let him produce a road and a carriage by means of which the force of a child would effect far more than that of the finest team on the old mail routes, on a level,—the level was a *sine qua non* condition for the full development of the advantage of the new system. Let the rigid road rise at the rate only of 1 in 300, a rise all but imperceptible to the stage-coachman, and the power required for propulsion must be doubled. In fact, by reducing running friction to a minimum, the difficulty of ascent appeared, relatively, to be raised to a maximum. If friction could have been so far done away with that a wagon could have been propelled by a touch, still the slightest ascent involved the need of a power adequate to lift the load in the air to the exact height attained by the summit of the incline.

With this unquestionable fact clearly in view, it was the object of the engineers of the school of Stephenson to reduce gradients, as they were called, to a minimum, and rather to wait upon nature, by following the circuitous course of a river valley, than to force nature, by the construction of lines made as the crow flies, involving not only heavier earth-works, but also steeper gradients, than those of a valley route.

Of the mechanical truth of the principle always insisted on by Stephenson there can be no question. But locomotion, although dependent on mechanics, is not simply a mechanical question. Locality goes for much. In the actual configuration of the surface of a country certain differences of level exist, and, roughly speaking, have to be accepted and provided for. To surmount an unavoidable hill, even though you have the advantage of running easily down again, is a positive loss of power and source of cost. But to carry a traffic from London to Birmingham it is necessary, sooner or later, to raise the weight carried from the level of the Thames to that of New-street or the Bull Ring. There is no avoiding the actual rise.

Thus in selecting river valleys, in following the courses of canals, in excavating and tunnelling so as to reduce intermediate summits, much may be done to economise tractive power. But no care, and no outlay, will reduce the cost due to the actual difference of level between termini. The cost of working a line may be indefinitely increased, but that power adequate to overcome that further dead weight of gravitation must be produced there can be no doubt at all.

With this question of unavoidable cost of going up-hill, put it in the best manner you can, has often been blended an entirely different consideration. It is that of the application of power. The first circumstance on which the possible speed of railway travelling depends is, that the adhesion of the driving-wheel to the rail is sufficient to allow of the propulsion of the train. When it came to be a question of climbing it was feared that this adhesion would not suffice. It was proposed, and indeed carried out, by Mr. Robert Stephenson, that the inclines of one in seventy-five and one in sixty-six on the extension from Camden Town to Euston-square should be worked by a stationary engine. It was only experience that decided that locomotive power was available, as well as more convenient, over these inclines. At the Lickey incline, near Bromsgrove, another case where the natural features of the country refused to be coaxed by the engineer, an incline of one in thirty-two was worked by locomotives from the

very opening of the Birmingham and Gloucester Railway. The past summer has seen the solution of the same problem on the Mont Cenis pass. As far as the application of locomotive power is concerned, it is now certain that inclines of one in forty, one in thirty, and even more, are perfectly manageable. The question, then, reduces itself to one of expense.

Were a group of lines, differing in their gradients, or, at all events, differing in the amounts of actual lifting work that has to be accomplished in the transit of each convoy, to resemble each other in every other element of working cost, it would be possible to ascertain from the accounts, if properly kept, what was the different amount of summit level to be surmounted in each case. From the present state of the returns made to the half-yearly meetings of the various companies, cumbrous and voluminous as many of them are, it is impossible to arrive at any such definite result. But looking forward to the time when uniformity of management, of accounts, and of dividend, shall result from an efficient central control of the railways of the United Kingdom, we are justified in expecting that a direct correspondence between the cost of locomotive power and the character of the grading of a line will be found invariably to exist.

Clear perception as to what amount of economy is, and what is not, attainable by the employment of rigid bearing surfaces for roads underlies the solution of that important question as to street railways, and branch or supplementary lines, which is now commencing to attract the attention of the public. To the short-sighted proceedings of the directors of the South-Eastern railways we shall, no doubt, owe an earlier practical insight into this subject than could otherwise have been anticipated.

In fact, we see in almost every part of the country lines of streets forming themselves near and around the stations of our various railways, or parallel to their course. That which must follow is the arrangement of railways, tramways, or anti-friction roads of some kind, parallel to the direction of our streets. When we once distinctly understand what can and what cannot be effected by the reduction of friction, we shall hasten to grasp the advantages which are to be derived from the introduction of street railways. The most remarkable part of the matter is, that we have drawn so little practical inference from the information which we have actually acquired. How long is it since lines of rail have been laid through the docks at Liverpool? How slow and tentative have been the arguments for running first-class carriages alongside, or even on the decks, of the steamers for Dublin, Calais, Brazil? The saving of time, of expense, of annoyance, of everything worth saving, that arises from a prolongation of a line of rails to the very end of a journey, instead of condemning all descriptions of passengers to a supplementary cab, or omnibus, or carriage, is at least equal to that which is effected by the substitution of a good pier, alongside of which a steamer can moor, and from which the passengers can step on board, for an open and crazy boat.

As the supplement, or rather complement, to the existing system of English railways, the introduction of light branches, and of street rail or tram ways can only be a question of time. What is less certain, but highly important, is, the further question of how far light street railways, worked by horse power, or, perhaps, by light locomotives,—engine and carriages being made of steel, and designed for passenger traffic alone,—may be available to check such a public injustice as that now in course of perpetration by the directors of the South-Eastern lines. Speaking with due reserve, and without any wish to give value to the patent of Mr. A., or to the project of Mr. B., we think that such a check is attainable. The next Parliament would feel, it is probable, compelled to authorise a scheme for which the capital was found by aggrieved residents acting in self-defence. The cost, if we take such experience as is to be gleaned abroad, would not exceed from 3,000*l.* to 4,000*l.* per mile, for the Grundsett and Hamar line, of thirty miles on a 3 ft. 6 in. gauge, was opened in 1864 at a cost, including rolling stock and stations, of 3,000*l.* per mile. We call the attention of those of our friends who are smarting under the recent inflictions of railway penalties to this subject. Mr. Watkin and his brother directors may yet prove to be benefactors to their countrymen, as the means of introducing, in spite of themselves, light suburban passenger railways into the outskirts of the metropolis.

WATER SUPPLY, SEWAGE, IRRIGATION, AND NAVIGATION.

IN the pages of the daily papers there have appeared lately articles upon the subjects of water supply, sewage, irrigation, and navigation, from the pens respectively of Sir John Rennie, C.E., and Mr. W. B. Adams, C.E., treating very ably of the above important subjects; and, following as they do in the wake of the *Builder*, and of Mr. Bailey Denton, whose arguments they fully corroborate, it is sincerely to be hoped that as we have succeeded in arousing a feeling of strong interest and ardent sympathy in the cause, and have enlisted the services of some shrewd and sound thinkers upon the subject, it will be pursued with energy and determination, until a satisfactory result has been produced alike beneficial to all the very important interests involved. We trust this momentous question may not be allowed to lag or drop again until it has been practically solved, and placed in that clear and unerring light that public opinion may fully understand the question, and thus by these means our future legislators may be educated, trained, and induced to develop a perfect remedy by imperial legislation.

The long period of drought through which we are now passing has extended over an interval of nearly three months (except in a few isolated cases of rainfall, or thunderstorms in a few instances). From Manchester, Halifax, Sheffield, Bradford, and many other places the wail is for water; and even in those places where it was supposed the supply was skilfully arranged and carefully calculated to be full and ample for all times and seasons, the hope has not been verified. This last season has aroused the fears and anxieties of the denizens of our cities and towns, and the population of the country generally, lest a total failure should take place; and it has already produced a disastrous and damaging effect on vegetation, except to one cereal crop, which is fine and superabundant, evidently thriving best in a dry season; and this will serve in some measure to counterbalance the loss to the country in the lamentable failure of other produce. Our barley and oat fields look stunted and thin, and our turnip fields are comparatively bare; so that, doubtless, though we may have a cheap loaf, the price of meat and other necessaries of life will be comparatively high, unless the markets of the country are equilibrated by importations of those articles of consumption from other parts.

This extraordinary dry season, with all its serious consequences, ought to arouse the energies and sympathies of our Government, our legislators, land-holders, agriculturists, and our town populations generally, to this very important subject—perhaps one of the most important subjects of the day and hour; and that this partial privation of this very necessary element of life in animated nature and the vegetable world may be the means of working a large amount of public good, by directing earnest attention more particularly to it, with the view of enlisting the national sympathies in that direction, leading to a large and comprehensive measure that will prove an effectual remedy to this state of things. It is an admitted fact, and patent to all, that in every part of this country we have at some period of the year copious supplies of rainfall, yielding a superabundance of water to replenish our rivers, brooks, and springs; and we ought, as a matter of right and duty, studying the national welfare, to utilise and economise these blessings so bountifully showered down upon us, and to make proper and ample provision in the rainy season, by storing up our surplus water, that will fully and at all times carry us over a dry season, so that neither man nor animals, nor even vegetation should perish for the want of copious supplies of this vital and indispensable element of existence.

In the case of our water-supply we fail to exercise that far-seeing and provident principle which is usually thought to distinguish the race of Anglo-Saxons, and which peculiarity exalts them above the ordinary run of nations; and as our common country becomes more dense and thickly populated, and agriculture is made to yield manifold crops under the pressure of a scientific mode of culture, the rainfall of the country must, as a matter of necessity, be collected and utilised, at any rate, so far as it is required for the proper water-supply of the population, for the purpose of irrigating the land, and to keep open and in proper order our various navigations.

It is perfectly astonishing how rapidly agricultural produce springs up and grows in tropical countries in those periods of the rainy season that are alternately showery and sunshine: the copious down-pour of rain and the heat of the sun between the showers force vegetation so rapidly, that it may almost be said to be seen to grow; and the sowing of the seed, the growth, the maturity, and the gathering of the crop, are a work of only a few weeks, and such crops that would gladden the hearts of our husbandmen; while, on the contrary with us, the various progresses described are spread over the best part of the year, and the result is at all times a matter of speculation, grave anxieties, and doubts.

In those tropical countries where maize forms the staff of life, the yield from cultivation is marvellous, one grain of maize producing from 400 to 800 fold, if the situation be favourable to its growth, and it is well supplied with water, either from rainfall or irrigation. The latter will more than double the crop.

In countries which we have known, maize grows to a height of from 10 ft. to 14 ft., and from the time of sowing the seed to gathering in the harvest there is a period of only about six weeks: it shows plainly and incontestably what an incentive to growth and production a plentiful supply of water is, whether in the shape of continuous showers or irrigation, and, with the all-powerful rays of a tropical sun, the earth yields forth her increase in great and surpassing abundance.

But even the production of that useful cereal, maize, is excelled in those countries by another tropical plant called the "plantain," which is wonderfully luxuriant; and next to maize forms the principal food of the people.

The stem is soft, herbaceous, 15 ft. or 20 ft. high, with leaves often 6 ft. long and nearly 2 ft. broad. The fruit is about 1 in. in diameter, and 8 in. or 9 in. long, and it grows in clusters. When ripe it is filled with a pulp of a luscious, sweet taste, somewhat resembling ripe apples. Its yield is enormous. From a single acre it is calculated to produce a quantity equal to the crop of 133 acres of wheat, or 44 acres of potatoes.

And these are cases in point of what may be done on a fruitful soil, with plenty of sun, and an ample supply of water for irrigating purposes.

This year we have had a taste of a tropical sun and heat, but we unhappily lack the liquid and invigorating element to render the visitation a blessing, and an advantage to agriculture. Let us picture to ourselves what would have been the result if the rain-falls of last winter had been collected and stored up on the drainage area of all our rivers, and our lands had been laid out scientifically for the purposes of irrigation, the produce of all kinds would have been manifold, splendid, and magnificent, and such only as those who have observed such remarkable circumstances in those highly-favoured lands above mentioned, where the vegetable productions are extraordinary and wonderful, are able to appreciate.

In India and other tropical countries a scarcity of rainfall or a comparatively dry season means a shortness or failure of the crop; and if a copious supply of the vital element is so necessary there to infuse life and vigour into plants, it is equally necessary with us in many seasons, and particularly in this just elapsing, as our agriculturists look tamely but anxiously on while the scorching rays of a powerful sun wither and parch up their precious and costly crops, and they are quite helpless to avert the calamitous result.

Our system of agriculture appears to be open to considerable amendment and improvement, such as are capable of meeting all the requirements and necessities occasioned by the changeable character of the climate. In certain seasons under-drainage is necessary to render the soil dry, and to carry off the surplus water that would otherwise injure vegetation, which, in a dry season, would be of very questionable advantage, if not a positive injury; and in dry seasons we ought to be prepared with a sound, practical system of irrigation, that would supply the deficiency arising from a lack of rainfall; and if the sewage of our towns, which is now to a considerable extent thrown into our rivers and wasted, is not fully equal to supply the necessary amount of the aliment necessary for the food of plants, the rainfall of the district stored up should be resorted to, to support vegetation in a healthy state, and to aid in the increase of the productions of the soil, so essential to the wants of a largely increasing population.

There is one subject to which Sir John Rennie draws particular attention in the case of the River Thames, and that is the deposit of the solid part of the London sewage in the navigable channel of the river at its outfall, and thereby causing an accumulation of mud-banks injurious to the navigation.

This is certainly an evil, but we apprehend it is only of a temporary character, as it cannot be supposed that so large a quantity of valuable manure can be thus so ruthlessly thrown to waste, particularly as its value and the necessity for its use to agriculture is now coming to be understood; but even the deposit there is better than when discharged into the river, as formerly practised, poisoning most barbarously the very atmosphere we breathed. It is rather a difficult matter, no doubt, in the present state of the question, to devise a practicable scheme, and hastily solve the problem to deal satisfactorily with so large a volume of sewage; but the day is surely not far distant, as so many skilful, enterprising, and energetic men are turning their attention to this much-vexed question, when the sewage will be applied to its only legitimate uses as a valuable manure, although many may doubt whether land is always in a condition fit to receive it; that is, when crops are about maturing, when the earth is already saturated with moisture, or under times of frost, as the sewage will never cease to flow, and means must be devised at those times to purify and otherwise utilize it, so as to prevent it further injuring our rivers and brooks. But plans appear to be now the subject of experiment, which may lead to some practical result.

Though there are difficulties attending it, they are such as may be grappled and dealt with, as may be evidenced at many places in the country on a small scale; and although the progress to mature successful plans has been somewhat slow since the question was first mooted, we hope soon to see it brought to an early issue in a well-considered and practical measure, alike beneficial to the welfare of our thickly populated cities and towns and the general interest of agriculture. Science is making rapid strides in the improvement of agricultural implements. We now have the aid of all-powerful steam and machinery to assist in gathering in the crops more efficiently and expeditiously than by the old system of manual labour: this harvest, in consequence, we have not heard a complaint made of the scarcity of labour; and science is now ready with other important aids to augment the productions of the soil for the benefit of man. Let us, therefore, at once avail ourselves of her wise and able teachings, and endeavour to profit as largely as possible by her grand discoveries.

It is quite idle to suppose, and unworthy of our national character, that the very material of all others that our agriculturists require to replenish and invigorate the soil should be thrown to waste, and thus made to defile the precious water of our rivers, spreading disease and misery through the country instead of life, health, and plenty: material which would at the present time have been the salvation of many crops, and great wealth and happiness to the industrious husbandmen, and have absolutely made the difference between abundance, plenty, and cheapness, and shortness, scarcity, and dearness. We ardently hope that no time will be lost in applying a remedy to this anomalous state of things, and removing this foul blot from our national escutcheon.

As the poet says, it is a pleasant contemplation—

> "To scatter plenty o'er a smiling land,
> And read its history in a nation's eyes."

The area within the rock-bound margin of our little island is so limited, and our population increases so rapidly (notwithstanding the drawbacks of colonial emigration), that if means can be devised to grow more blades of corn on cultivated land, and make our large tracts of wastes and barren sands to blossom like the rose by the means pointed out, it would be a difficult matter to estimate the amount of benefit the nation would derive from it; and those men who aid in any way in solving the difficulty, and triumphing over it, will be as worthy of all honour, and their names will be as rightly inscribed on the rolls of fame as those who devote their lives and talents to adorn the councils of the nation, or who dazzle with their lore and eloquence.

The subject of the navigation of our rivers and canals is also of the greatest importance, and our rain-fall should be conserved for the purpose of aiding the supply of water to them in periods of drought.

In a former article we drew attention to the efforts made by our old canal engineers to supply canals at the early period of their history, as it was then of the utmost importance that those great arteries of the country should be kept open to traffic at all times and seasons, and we give them credit to a considerable extent in having succeeded in doing so; but the abstraction of the water for our town wants from the sources through which they obtained it, has absorbed to some extent their principal sources of supply without affording them an adequate equivalent; and on these grounds we ought to store up our rain-fall in winter and spring, to keep open and in proper action these important channels of communication, as well as to aid in replenishing and renewing the continuous flow of the water in rivers and canals.

As the weather we have had for some months past has been of a tropical character, there is little doubt we shall have a rainy season of some length, and during that period it is to be apprehended we may be visited with epidemic and endemic diseases, as at those times in the tropics a heavy visitation of sickness usually follows the change in the season. Let us, therefore, hope that the authorities of our cities and towns will see that their houses are put in order, so that, should these expectations be unhappily realized, we may be in a condition to ward off the evil consequences, or at any rate to mitigate them so far as human care and foresight can accomplish it.

The work will be incomplete so long as they cast a valuable fertilizer of the soil to waste, robbing our lands of their proper natural aliment, defiling the most beautiful objects in our picturesque scenery.

PETROLEUM AND LEGISLATION FOR IT.

THE heartrending disaster which occurred at Abergele on Thursday, August 20th, by which thirty-three persons were ushered into eternity, naturally leads us to inquire concerning the nature of the substance which produced such dreadful destruction of human life. Petroleum is met with at Inniskillin, Canada West, Kenhawa in Virginia, Scotsville, Ky., Oil Creek in Venango Co., Pennsylvania, Duck Creek in Monroe Co., Ohio, and Liverpool, Ohio. It was formerly collected and sold by the Seneca and other Indians, and is hence called Seneca or Genesee oil. It is also found in Burmah. In 1862 about nine millions of gallons of petroleum oil were imported from the United States; of this large quantity nearly half came to England. In 1866 the yield was so large from the States that it was actually in excess of the demand. A district of Scotland west of Edinburgh goes by the name of the "Scottish Petrolia." This consists of oil-bearing shale, and is so valuable that a piece of land before worth 2,000*l.* is now worth 200,000*l.* These bleak upland farms have been found to be mines of wealth, and villages will spring into towns.

Petroleum (Greek πετρα, a rock, and ελαιον, oil) is a mineral substance very like naphtha, composed of a number of hydrocarbons. Geologists consider it to be a product of the bituminous shale, which attains in America enormous extent and thickness; in Michigan a thickness of 4,900 ft. Others regard it as a product of the distillation of subterranean coal-beds, and conceive the cavities of the upper strata serve as receivers to the vast coal retorts below; from such cavities the condensed vapour may be supposed to filter through the soil sometimes to much lower ground than its source, *i. e.* on the principle of an artesian well. Dr. Mantell says, "It appears probable that petroleum has originated from the coniferous trees whose remains have contributed so largely to the formation of coal; and that the mineral oil is nothing more than the turpentine oil of the pines of former ages: not only the wood, but also large accumulations of the needle-like leaves of the pines, may have contributed to this process. We thus have the satisfaction of obtaining, after the lapse of thousands of years, information as to the intimate compositions of those ancient forests of the period of the great coal-formation, whose comparison with the present vegetation of our globe is a subject of so much interest. The mineral oil may be ranked with amber, succinite, and other similar bodies which occur in the strata. The springs of petroleum do not seem to depend upon combustion, as has been supposed, but to be simply the effect of subterranean heat. According to the information we now possess, it is not necessary that strata should be of very great depth beneath the surface to acquire a temperature equal to the boiling point of water or mineral oil. In such a position the oil must have suffered a slow distillation, and have found its way to the surface; or have so impregnated a portion of the earth as to form springs or wells."

Mr. Sonstadt says it is scarcely possible to bore deeply anywhere near the Ohio river without striking a source of the oil. Nor, judging by analogy, does there appear to be any likelihood of these wells failing for hundreds of years.

When petroleum is distilled at a low heat benzine is obtained. This is a light and very combustible fluid, too dangerous to be used for illuminating purposes, but very useful for cleaning fabrics from grease spots. The next substance obtained is paraffine (French, from Latin *parum*, little, and *affinis*, allied), so named for its resistance to combine with an alkali. This is also called Belmontine oil, from Belmont, one of Messrs. Price & Co.'s manufactories. A lubricating oil used for machinery is also obtained by further distillation, and also Belmontine, a solid substance of a fine translucent white colour, which makes beautiful-looking candles at a small cost. The stearic acid in these candles possesses a high illuminating power, and thus with a finer wick we get a brighter light than ten of the nearly obsolete "dips" used to give us. Dr. Stenhouse has shown that paraffine is the best water-proofing agent that we possess.

Petroleum oil is not nearly so dangerous as turpentine oil. It will not explode unless mixed with three or four times its bulk of atmospheric air. Paraffine oil cannot be ignited under a temperature of 140° Fahrenheit.

Petroleum is said to have been used for lamps in Ohio as early as 1819. The first well at Oil Creek, Pennsylvania, was sunk in 1859, and a tax was laid upon the oil in the United States in July, 1864.

The legislation on the subject in England is contained in two Acts, passed in 1862 and 1868; and of these measures the following is a carefully condensed summary:—

The Act of 1862 recites the expediency of providing for the safe-keeping of petroleum and certain products thereof that are dangerous to life and property from their properties of giving off inflammable vapours at low temperatures. The Act provides that petroleum shall include any product thereof that gives off an inflammable vapour at a temperature of less than 100° Fahrenheit. It will be seen below that the Act of 1868 is much wider in its operation, and includes many substances not products of petroleum. Under the Act of 1862, every vessel carrying petroleum, or entering any harbour within the United Kingdom, is to conform to any regulations made by the harbour authorities as to the place at which she is to be moored. Disobedience entails a penalty of 20*l.* a day. The vessel may be removed to a safe place at the expense of the owner or master. The provision in the Act of 1862 respecting the storage of petroleum has been repealed by the Act of last session. The latter Act provides that, from the 1st of February, 1869, no petroleum shall be kept, otherwise than for private use, within fifty yards of a dwelling-house or of a building in which goods are stored, except in pursuance of a licence given in accordance with the Act of 1862. Conditions which may seem expedient to the local authority may be annexed to any such licence as to the mode of storage, the nature of the goods with which petroleum may be stored, the testing of petroleum, and generally as to its safe-keeping. Petroleum kept in contravention of the law shall be forfeited, and, in addition thereto, the occupier of the place in which such petroleum is kept shall be liable to a penalty not exceeding 20*l.* per day during the time the petroleum is illegally kept. Under the Act of 1868, the interpretation of the word "petroleum" is extended to mean all rock oil, Rangoon oil, Burmah oil and any product of them, and also any oil made from petroleum, coal, schist, shale, peat, or other bituminous substance and any product of them that gives off an inflammable vapour at a temperature of less than 100° Fahrenheit.

The licences which are referred to above, may be granted in the City of London by the Court of Lord Mayor and Aldermen; in the metropolis outside the City, by the Metropolitan Board of Works; in English and Irish boroughs, by the council; in Scotland, by town councils, or police

commissioners, or county justices of the peace, according to circumstances; in any harbour, by the harbour authority; in places in England or Ireland, not boroughs, by local trustees or improvement commissioners, or by justices assembled in petty sessions. Licences are valid if signed by two or more of the persons constituting the local authority, or executed as other licences are executed by the same authority. They may be granted for a limited time, and there may be conditions annexed as to removal or otherwise, which the local authority thinks necessary for diminishing the risk of damage from explosion or fire. If the licence be refused, or be granted on unsatisfactory conditions, the applicant may demand a certificate of the grounds of refusal, or of attaching such conditions, and he may memorialise the Secretary of State, or (if in Ireland) Lord Lieutenant, who may make inquiry; and, should he think proper, may grant the licence in the manner prayed for. Of all forfeitures and penalties half is to go to the crown and half to the informer, unless such informer be a servant of the person informed against, in which case the informer's half shall be applied in such manner, and to such other purposes as the convicting justices may think fit. Respecting Scotland there is a provision for imprisonment for a period not exceeding three months, if the penalties be not paid. The clause respecting Scotland says nothing about the informer receiving half, but leaves the half which is not for the crown to be disposed of as the magistrates direct. Petroleum may be searched for in the same manner as, under the Gunpowder Act of 1860, gunpowder may be searched for; and all the provisions of the Gunpowder Act relating to searches are to be incorporated with the Petroleum Acts.

In order to protect the public against explosions, it is enacted by the recent statute that, from the 1st February, 1869, no person is to sell, or expose for sale, for use within the United Kingdom, any description of petroleum which gives off an inflammable vapour at a temperature of less than 100° Fahrenheit, unless the bottle or vessel containing such petroleum shall have attached thereto a label with the following words, in legible characters: "Great care must be taken in bringing any light near to the contents of this vessel, as they give off an inflammable vapour at a temperature of less than 100° of Fahrenheit's thermometer." Any person acting in contravention of this provision is to be liable for each offence to a penalty of not exceeding 5*l*. Inspectors of weights and measures are empowered by the late Act, at all reasonable times to inspect and test all petroleum kept, offered, or exposed for sale; and if it shall be found under circumstances infringing the law it may be seized, and, upon conviction, forfeited. The inspector is to retain a sample, and the offender is to be liable to a penalty not exceeding 5*l*. If, however, the accused shall claim to have a further test made on his behalf, the magistrate hearing the case shall call before him the public analyst, or, if there be no such officer in the district, some other person having competent chemical knowledge, who shall test the sample and give evidence of the result. The analyst is to be paid a sum not less than 2s. 6d. nor more than 10s. 6d., and in case of conviction the offender is to pay the cost of the analysis. All offences under the petroleum Acts may be tried as police offences, by any magistrate acting under any general or local police Act.

There is a schedule annexed to the new Act containing, in minute scientific detail, instructions as to the mode of testing petroleum in order to find out at what temperature it gives off inflammable vapour.

Paraffine was discovered by Reichenbach, in coal, wood, and tar, in 1830; and Dr. Lyon Playfair directed the attention of Mr. Young, some years ago, to a thick, dark-coloured, oily liquid, oozing from the roof of an old coal-mine in Derbyshire. He found it was a kind of mineral naphtha, purified it, and a factory was established; but as the oil soon ceased it was discontinued. Mr. Young then tried experiments on the coal, from which he considered that the oil must have been distilled, and he found that coal distilled at a low temperature, yielded a considerable amount of gas, and no tar at all, but in their place a large amount of vapour, which could be readily condensed into an oil, *i.e.*, into paraffine oil. A factory was established, and the process patented in 1850, at Bathgate, near Edinburgh, which now employs more than 800 men. The crude oil procured by the first distillation is a thick, dark-coloured liquid, and the first step towards its purification, consists in simple distillation, which, observes Mr. Tegetmeier, is performed in large iron stills, weighing as much as five tons each. In these the oil is distilled, there being left in the still a mass of bright shining hard coke, which is nearly as possible pure carbon. The oil is then mixed with oil of vitriol, and after having been allowed to rest, is distilled again, and separated into four portions, naphtha, paraffine oil, lubricating oil, and solid paraffine.

Colonel Julius Adams, of New York, made experiments on the use of petroleum as fuel in combination with steam, for the heating of steam-boilers. The advantage of the oil as a fuel for marine engines have been thus stated:—

"Rapidity with which steam may be raised, reduced dimensions of boiler and furnace below that required for coal,—the continuous firing effected by feeding the fuel through a pipe into the furnace, thereby preventing the great loss of heat in the furnace every time a fresh supply of coal is thrown on, and the rush of cold air upon the opening of the furnace-doors,—the freedom from smoke, cinder, ash, or refuse of any kind, which in coal reaches from 7 per cent. to 16 per cent. of the whole amount. In the ability to command a forced fire almost instantly, without a forced draught, which under some circumstances at sea, is of vital importance. In dispensing with the numerous class of coal-heavers, stokers, &c., and all the inconvenience of raising clinkers and ash from the furnace-rooms; and, finally, the diminished space occupied in the storage of the fuel."

Experiments were afterwards made at Woolwich, conducted by Mr. Richardson. His report informs us that 1 lb. of oil will evaporate about double the weight of water which 1 lb. of coal, burnt in the ordinary way, would evaporate. If the price of the oil is materially reduced the substance may come into use for engines instead of coal. Mr. Richardson says:—

"The experiments at Woolwich were necessarily commenced with the best and more expensive petroleums. Nothing was known of their properties as fuels; the result has proved that those which contain spirit and burning oil are not so well suited for fuel as those from which they have been extracted; but until a method was arrived at of getting rid of the smoke no others could be used. The smoke was mastered by simply decomposing a little water-vapour, carbonizing and burning the gases. The heavy oils, as they are termed,—those from which the spirit and burning oil have been extracted,—are about the consistency of gas-tar. Their market-price is at present 5*l*. per ton. When we remember that the gas-tar is the same as the heavy oil, only in a more concentrated form, and that it can be obtained in any quantity at 18s. per ton, cheapness would be the result of an enlarged manufacture."

Petroleum oil has been used for fuel in a steam fire-engine in Boston, U.S. It does not, like other fuel, clog the exhaust-pipes. In this instance the engine gained 30 per cent. of water-pressure in excess of any other machine on the ground.

A large per-centage of petroleum may be distilled from pitch, but the process is expensive, and the smell of the oil so procured very offensive; so that petroleum obtained from it is not likely to come into competition with that which comes up from the ground in a liquid state. The Pitch Lake, in the Island of Trinidad, is one of the most extraordinary phenomena of the volcanic kind in the world. Curiously enough the vegetation around is very rich, and the pitch appears to give a deeper tint of green to the plants. The lake is about a mile and a half in circumference, and except in the wet season a person may walk on the solid pitch for a considerable distance from the edge. It is a bituminous quicksand, and in some places an oily substance oozes up when the foot is put down. A stout pole will disappear, when planted in the asphalt, in the course of a quarter of an hour; so it is as well for persons to take the policeman's advice, and keep "moving on." Natural channels intersect the lake in all directions, filled with the clearest fresh water. Fish have been found in these streams. There is certainly a communication between the lake and the sea, for marked poles have been thrust into the lake and engulphed, and in the course of a few days afterwards they have been picked up on the seashore. Mr. Rowsell says it is probable that the Pitch Lake may at any time belie the experience of the inhabitants, and show itself in the terrible shape of an active discharging volcano, having a crater a mile and a half in circumference, full of the most destructive and ruthless agents it is possible to imagine. There is, in fact, nothing to show that there is not a slumbering volcanic agency which at any time may bring destruction on the island. In Canada the deposits of asphaltum or mineral pitch are called gum-beds. A cubic foot of this, it is said, represents the effusion of 60 to 80 cubic feet of lubricating oil, and from 100 to 120 ft. of illuminating oil. This might perhaps be made available for engines. Some of the best oil-wells in Canada are sunk on or near these gum-beds. *Apropos* of oil, the *Athenæum*, some time ago, stated that at Büren, a Swiss village which tourists will remember when walking up the valley of the Suhr, the inhabitants have begun to manufacture oil from chafers. The process was initiated by two men, who having noticed that a chafer looked greasy when squeezed, thought that the grease might be useful for the wheels of their cars. They caught a number of chafers, subjected them to pressure, and obtained a quantity of greasy fluid, which after a few days became clear and yellow, and on trial was found to burn brilliantly, with an agreeable odour. Forthwith there was a general chase after the chafers by the villagers, of which the results are said to exceed their expectations.

The paraffine oil surpasses every light in brilliancy combined with economy. One gallon of paraffine oil is equal in illuminating power to one gallon and a fourth of the best petroleum oil, or to 26 lb. of wax candles, and to 36 lb. of ordinary tallow candles; so that as Mr. Tegetmeier remarks, one pennyworth of paraffine oil is equivalent in light-producing power to 1lb. of common candles. Here is therefore another instance out of many in which science has benefited the working classes. In many a cottage, instead of a dirty-looking "dip" giving a poor light, we see a neat lamp fed with this oil at half the cost of the former, with many times its illuminating power. And in all sections of the middle classes the beautiful paraffine candles have taken the place of the commoner sorts. In the matter of light, the progress effected in this generation contrasts most surprisingly with the aggregate of the progress effected in all previous generations put together since the earliest dawn of authentic history. A writer in the *Spectator* a short time ago, drew attention to this fact, pointing out that the lamps and torches which illuminated Belshazzar's feast were probably just as brilliant, and framed out of nearly the same materials as those which shone upon the splendid fêtes of Versailles, when Marie Antoinette presided over them, or those of the Tuileries during the imperial magnificence of the First Napoleon. Pine-wood oil, and perhaps wax, lighted the banquet-halls of the wealthiest nobles, alike in the 18th century before Christ, and in the 18th century after Christ. There was little difference except in finish of workmanship and elegance of design—little if any advance, we mean, in the illuminating power, or in the source whence that power was drawn—between the lamps used in the days of the Pyramids, the days of the Coliseum, and the days of Kensington Palace. Fifty years ago, that is, we burnt the same articles, and got about the same amount of light from them, as we did 5,000 years ago. Now we use gas of which each burner is equal to fifteen or twenty candles; or when we wish for more, can have recourse to the electric light or analogous inventions, which are fifty-fold more brilliant and far-reaching than even the brightest gas.

SAVANS IN NORWICH.

RETURNING to the papers read by Canon Girdlestone and Mr. Corrance on

The Condition of the Agricultural Labourer,

noticed in our account of proceedings by the British Association for Science,* we add some of the observations made during the animated discussions that followed.

Professor Leone Levi said: The subject with which these papers dealt applied to two-thirds of the population of the country, and to some of its largest interests, for he believed that the income of the working classes amounted to 400,000,000*l*., and that of the agricultural labourers might be taken at 60,000,000*l*. He sympathised with a great deal that had been

* See p. 635, *ante*.

brought forward by Canon Girdlestone, but at the same time he thought that there were other circumstances than those which had been referred to that ought to be taken into consideration. The labour of the agriculturist was a very healthy one, and the labourers were long-lived, so that they received wages for many years; whereas the working man of Sheffield, although he might get from 2*l.* to 3*l.* a week, could not look forward to the enjoyment of those wages for a period of more than twenty years, at the end of which time he left a widow and probably a family. Therefore, if the Sheffield workman received more wages, his position was not thereby improved, because the agricultural labourer continued to live longer and to support his family for a more extended period. Upon a broad view he did not think that wages paid in the country were unfairly low. They were certainly better now than they were some years ago. To his mind it was not by strikes that wages were to be improved. For if labour was suspended there could be no wages, and the result was diminished capital or reduced wealth. Consequently, strikes were rather a hinderance than a stimulus to the progress of wages, although in some isolated cases a temporary improvement might be obtained by resorting to such questionable means. If the individual members of the working classes, instead of studying the improvement of their homes and morals, began to engage in politics and formed societies for defending their political rights, he thought they would rather lose than gain by their efforts. In respect to co-operation, by means of unions, he thought that though these might be a useful medium for those who attained a certain amount of education, it was hardly a system that could be resorted to at the present moment with any great advantage to the working classes. If this country were to keep *pari passu* with other countries, all anxious to make progress, and ready to make the greatest sacrifices in accomplishing that object, it must go forward and not backward in this question of education. Another point was that it was important for the working classes to concede they were responsible to society generally for the manner in which they filled up their time, wasted their opportunities, and lost the chances which were seldom given to them more than once.

A member said he thought it was a discredit to the country that the principal buildings in our towns should be the gaols, workhouses, and lunatic asylums; and he was of opinion that if they were removed into the country, and their inmates set to work in their immediate neighbourhood, it would be a vast improvement on the present system. With regard to the question of co-operation, he instanced the case of Mr. Briggs's colliers, who were allowed a share in the profits of their labour, and stated that the system had been found to work with great success.

Dr. E. Crisp offered a suggestion to the effect that reading-rooms, and places where the agricultural labourers might assemble for purposes of recreation and instruction, should be established for rural districts. He also recommended the adoption of the co-operative principle, as already carried out in the co-operative stores of London and other large towns.

Dr. Farr, thought it was quite right that they should take into account the duration of the agricultural labourer's life, and they ought likewise to consider the expense to which he was put, and the fact that if he were to get into an urban district, although he might receive more wages, the difference in his expenses would probably be such as to render him no better off for the change. It had been said by Mr. Hodgson that there was nothing so fallacious as figures, except facts. The fallacy of facts generally consisted in this, that an exceptional fact was taken and considered as an illustration applicable to the general state of things. He could not help thinking that the facts presented by Canon Girdlestone to some extent belonged to the class of exceptional facts; consequently they could have no general application. He trusted that the consideration of this question would take some really practical and tangible form, and that some resolution might be adopted that would have this effect.

Mr. H. E. Blyth expressed his regret that there should exist in any part of the country a class of men of whom such a picture could be drawn as that which had been placed before the association by Canon Girdlestone. He should not call in question the data from which the rev. canon had drawn his paper, inasmuch as he had had no opportunity of visiting North Devon, and of finding for himself the actual condition there of the landlords, farmers, and labourers. But he must humbly protest, in the name of the Norfolk men, against the application of such an illustration to the condition of the agricultural labourers of this county. They had not heard that legislation had done anything for the improvement of the people, and that education was defective; but no system had been suggested which was likely to settle the question satisfactorily. Education was undoubtedly a subject deserving of the most serious attention, particularly by those who filled the situation of masters and employers. With regard to the condition of the agricultural labourer in this country, he was sorry to say, from an experience of fifty years as a master, that the labourers did not set so high a value upon character as formerly, and that the masters were more lax than they used to be in considering the character of those whom they engaged. Speaking as a farmer, he regretted to say that the agricultural population was not progressing as it ought to do, either in a social, moral, or economical point of view. But with regard to economy, if the employers spoke of the want of it among the labouring class, could they point to those in their own sphere as examples worthy of imitation? The employers ought to endeavour to set an example which the lower classes might be expected to follow. They ought, first of all, to train up those who had to get their living by the sweat of their brow in such a way that they might fulfil their duty in the condition of life in which they were placed, and, ultimately, without or in spite of legislation, emerge therefrom, or improve their present condition.

Mr. C. S. Read, M.P., in a paper on recent improvements in Norfolk farming, afterwards read by him, said on this same subject:—The wages of the agricultural labourer in the last ten years, have been raised by nearly two shillings per week, and it is quite certain the men will not perform the same amount of work on this increased pay. This is easily proved by comparing the price of piecework with what it was a few years ago, but as the agricultural labourer has already formed the subject of two separate papers, I will not venture any further remarks on the subject. You, Mr. President, said that, in your opinion, one great reason for the unsatisfactory condition of the labouring population was their ignorance of *political economy*, and the chief hope you had of any improvement was their being taught the ground-work of this great science. In that I most cordially agree, for I protest against the partial application of scientific theories to agriculture. Hitherto political science has been applied only so far as it favours the consumer. You have exposed our agricultural produce to the competition of the cheap labour of the world, and to successfully hold our own we must have cheap labour too. In my small way I have done what I can to improve the condition of the agricultural labourer, and though I am ignorant of science, I believe my ideas are closely allied to sound political economy. I contend that the price of labour must in a great measure depend on supply and demand. In seasons of great mercantile activity our young labourers migrate by scores and hundreds to the north and to London, without the aid of any registration societies; for our great employers of labour have agents all over the country always looking out for strong active hands. Even our old labourers are not ignorant of the rate of wages paid elsewhere, but they know that high wages invariably mean longer hours, more work, and expensive living. Political economy would also tell the agricultural labourers that the way to raise their condition is not by combining together to do as little work as they can in a day, but to improve the quality of their work, and so earn more wages. I believe that every young agricultural labourer has the means of acquiring the most perfect independence; but he must learn to rely on his own industry, skill, and frugality, and not upon charity, an easy-going master, or the parish, for his support.

A committee was appointed to consider whether any steps should be taken to improve the condition of the agricultural labourer, and to report to the next meeting of the association.

Physical Sciences.

In the Mathematical and Physical Science Section, Colonel Strange read a paper "On the Necessity for State Intervention to Secure the Progress of Physical Science." The author stated, that knowledge, of whatever kind, was promoted principally in three ways,—viz., by teaching, by education, and by exhibition. Unless the young were instructed, unless the workers advanced beyond what they learnt when young, and unless the world was reminded of what had been done, and of what remained to be achieved, knowledge must languish. The provision, such as it was, which had been made in England to meet these three main requirements had grown up casually with the progress of society, and was not equally complete in all branches of knowledge. In literature extensive provision was made for instruction in our private and public schools and in our universities, while the fine arts were less cared for. They formed as yet no avowed part of general education in England. Neither music, painting, nor sculpture was taught systematically in our schools, nor encouraged warmly in our universities. The provision made in our academies for its extension was meagre in the extreme—from no fault, perhaps, of the professors or the system, but chiefly from the fact that this requirement was provided almost wholly from private, and, therefore, inadequate, resources. Art was better, if not perfectly, provided for; but that our pictures, statues, and music were seldom good was due to our imperfect means of teaching and of extension. The conviction long held by thinkers and workers in science that a knowledge of the products and the phenomena of the material universe should form a large part of the education of its inhabitants seemed at last to have dawned on society generally. It was one of the opinions of the day that scientific was at least of equal value with classic lore, that it must be infused early and freely into the minds of even children, and that it must be recognised in universities as an essential branch of a liberal education, sharing the honours and privileges heretofore too largely absorbed by Greek, Latin, and logic. Colonel Strange proposed the foundation of a national institution expressly for the practical advancement of scientific research apart from education—an institution for workers as distinguished from learners. Such an institution implied a building or buildings planned with a view to modern scientific requirements, of which the chief were ample space, absolute stability, and perfect command of light and temperature. It seemed indispensable that such an institution, being maintained at the public expense, should be as accessible as possible to the scientific public.

Water Power.

Mr. T. Login, C.E., read a paper on "The Abrading and Transporting Power of Water." After referring to the importance of water as an agent in adapting the world to a condition suitable for the habitation of man, the author observed that the power derivable from water, and the resistance of water to bodies passing through it, had been well investigated; but of the transporting power of water at different velocities very little was known. In illustration of this fact he spoke of the great controversy now going on between Sir Arthur Cotton and Sir Proby Cautley, two of the greatest engineers India had ever produced, with reference to the great Ganges Canal, and observed that on the correct settlement of this dispute great interest depended. Not only was it a subject for the philosopher to study, but for the politician, the philanthropist, and Christian, as the future prosperity of the great continent was bound up in it. Having entered into a minute account of observations taken in India with reference to the slope required to transport the earthy matters held in suspension, and prevent the canals from silting up, he arrived at the following conclusions:—That the transporting power of water must depend to some extent on the nature of the earthy matters to be transported; that water containing large quantities of such matters required greater slope than those containing small quantities, and that without a sufficient slope the earthy matters became deposited on the bed of the stream; that any obstruction in a silt-bearing stream will at once cause a deposit, which, if allowed to accumulate, will eventually cause an alteration in the course of the current; that water containing no such matter would continually deepen its bed had not nature provided that at certain seasons the rivers flowed under both conditions, and so preserved the balance. These observations led to the deduction that the slope of every canal intended for irrigation purposes should depend upon the velocity of the stream, the amount of

earthy matter held in suspension, and the character of such matter.

Professor Rankine observed upon the necessity that existed for greater attention being paid to irrigation in this country. Any one who travelled through the country within the last few weeks must have seen land where vegetation had been dried up, although in many cases there was an abundant supply of water within a few yards, which, however, was not available for want of the means of applying it. He suggested the appointment of a committee to investigate the power of water in transporting matters of different kinds, which distinction had not previously been known to science. Mr. Vignoles agreed in the desirability of irrigation, which was more especially valuable in Italy, Spain, and other countries, but in England he thought there was not uniformly such a scarcity of water as would render necessary any extensive works of the kind.

Patent Monopoly as affecting Progress

was treated of by Mr. Dircks, C.E. The author alluded to early State papers and scientific literature as recording secret and also patented inventions, thus distinguishing two classes of inventions, the former including inventions which two often never come to light, the latter those open to public use. He next distinguished patents as a monopoly in an individual property, —an otherwise secret invention,—one to which the possessor has an inalienable right. Noticing the obnoxious system that prevailed in the reign of Elizabeth, he traced the progress of improvement in the patent laws from James I. to the present period, freely admitting the importance of those reforms, and the possibility of carrying them still further. Regarding the so-called "frivolous patents," he considered they formed a very insignificant portion of the large numbers of patents granted annually, and likewise that it was next to impossible to distinguish between great and small inventions in reference to practical manufacturing operations, very small matters frequently engaging a large amount of labour and capital. Tracing the progress of patents from the one to six obtained annually during several reigns to the 3,000 or 4,000 annually granted at present, he concluded that a case of improvement and encouragement in science and manufactures was thus clearly made out, enumerating at the same time a variety of entirely new and most important chemical and mechanical manufactures, and recording the names of many distinguished patentees whose operations had no better protection than the old, expensive, and very defective patent laws that existed to the end of September, 1852.

A paper by Mr. Bell Galloway "On Inventors and Inventions," was read by the secretary. The author stated that for some years past foreign nations had offered great inducement to inventors and skilled workmen to leave England, and, as the result, much of the engineering and other branches of manufacture was now being done in foreign countries. With a view to prevent the continuance of this state of things he suggested the creation of a special fund to develop important and approved inventions, and that the association should ask for the whole of the balance of the money which has arisen from the working of the patent law, now amounting to a million sterling, as the nucleus of a fund for this purpose.

In the discussion which followed, Mr. Bramwell condemned the proposal of the author of the last paper. He denied that the fund accumulated amounted to anything like a million sterling, and said that such a proposal as that of Mr. Galloway would be a most prolific source of jobs, and the people who had to dispense the rewards would be amongst the most abused people to be met with in the country.

Capital and Labour.

Mr. Samuel Brown, in his inaugural address as president of the Economic Science Section, referred to the relation of wages to capital as a subject of vital importance in maintaining the position of this country in its competition abroad as well as with its peace and prosperity at home. He said, the opinion that labour and capital must be in antagonism, each trying to subdue the other to its own terms—an opinion which can only be entertained in ignorance of their relative functions—is becoming gradually undermined; and the earnest efforts of some of the most practical and enlightened employers of labour, aided by the increased intelligence and better feeling produced by conciliation, on the working classes, have allowed some important experiments to be fairly tried to reconcile the two opposing foes, and to bring them into harmonious working together. A most influential general committee has been formed under the auspices of the National Association for the Promotion of Social Science; and in a meeting at which the Right Hon. W. E. Gladstone presided, the question was debated, and certain general principles laid down for the course of proceeding. But the work to be accomplished is of the most laborious character. It is to be hoped, at any rate, that the clumsy and barbarous system of strikes and locks-out which destroy both the small savings of the workman and the capital out of which he hopes to increase his wages, and which keep up a perpetual source of irritation and ill-feeling, will be abolished as an insensate and reckless process. Trades unions are contended for by some as useful and effective, if not carried on to the injury of the trade, or to the detriment of the nation, and provided the members pursue their own objects without undue coercion of others. But without coercion and oppression how can they fulfil their objects? The limitation of times of labour, the depression of the sober, industrious, and most skilful workmen to an average level of the more idle and unskilful, the exclusion of apprentices, and the dire effects in other banches of the trade or manufacture in which without wishing to strike themselves, the workmen are dependent on the continued labour of others who will not work, naturally drive capital away into other countries or other trades, and thus leave the infatuated workman with worse prospects of success than when he began the strike. The president suggested as a powerful mode of co-operation, because it appeals more directly to the self-interest of the working classes, industrial partnerships in which the masters and workmen may unite together, by the adoption of which he believed the greater part of the difficulties between labour and production would vanish. The proper rate of bonus for labour must, no doubt, depend on the proportion which the labour bears to the other costs of production, and of bringing the article to market. Mr. Brown thus concluded:—In social science and political economy statistics may be considered the collection of experiments by the results of which we observe the hidden workings of the laws which regulate the social condition of man and his progress in civilization. The growth and decay of population, the freedom of capital and the rights of labour, the duty of voluntary or enforced education, the extent of Government interference in labour or manufactures, the competition of prices, the true principles of commerce, the most effectual means of suppression or prevention of crime, the theory of taxation and national loans, and multitudes of similar questions, are all governed by subtle laws affecting the free will of man, checked and kept in place by similar actions in others, of which we catch a glimpse sometimes by their irregular action in enforced or abnormal conditions, and sometimes by our having discovered and acted in harmony with the natural law which governs them. But as society is perpetually changing, what we have discovered and thought to be truth seems frequently inadequate to account for the new phenomena presented. It is only by extending our observations from the narrow sphere of a single country or a single class to all countries and all classes, by a uniform collection of statistics, as is now being done by all the Governments in Europe, by noting differences as well as analogies, and confessing and correcting errors and comparing the operation of the same causes under various conditions of interference, that we shall throw light on the many unsolved problems of social and political economy which modern civilization presents.

ABERGAVENNY TOWN-HALL AND MARKETS COMPETITION.—The commissioners met on Friday, 28th ult., and decided to give the first premium, 50*l.*, to Messrs. Wilson & Willcox, of Bath; the second, 20*l.*, to Mr. Haddon, of Hereford; and the third, 10*l.*, to the local competitor, Mr. Nevill. There were sixteen competitors. Each of the commissioners was furnished with a tabular paper, upon which were arranged the various requirements of the competition, and as each competitor fulfilled or failed in the particular requirement under consideration there was accorded or not a mark against his name. The work will be commenced at once.

ANTIQUITIES OF CORNWALL.

Early Christian Symbols.

AT the recent meeting in Cirencester, Mr. J. W. Grover read some "Observations on Relics of Ancient Cornwall," which carried on the subject opened by the Roman remains at Chedworth,—namely, the occurrence of Christian symbols on works of very early character,—a point of extreme interest. We print the greater portion of Mr. Grover's paper:—

My object, he said, is not to bring before you any new discovery, but rather to draw attention to such points of archæological interest as occurred very forcibly to me during a few days' stay in Cornwall last year; and I trust those who may have already investigated the subject of early Cornish antiquities will forgive me if I should happen to repeat what they already know; whilst those who have not had the opportunity of looking into the history of that ancient country will feel more interest in doing so, when I say that it clearly exhibits signs of very early Christianity,—of an earlier character, and of a date perhaps as old, if not older, than that which we find marks of in the Roman villa of Chedworth. Indeed, I must say that the general subject of early Christianity in Cornwall, in Roman times, seems to me to help us materially in our contemplation of the marks which are found at Chedworth, and in a very few other parts of Britain, as mentioned in my late paper in the "British Archæological Journal" on "Pre-Augustine Christianity in Britain." Cornwall is, indeed, a land of mystery; it seems to have been the head-quarters of Druidism in its most advanced stage of development. Except Brittany itself, I know no land more rich in all those precious relics of ancient heathenism, which we know by the names of Meni-herion, monoliths, tumuli, karns, circles, &c.,—clearly all of Eastern origin, and such as may still be seen in the valleys of Anti-Lebanon, and amongst the countries of the old Chaldean. When Christianity first dawned upon Cornwall the people were devoted to this Druidism, a religion which seems to have been a singular combination of the worship of many deities with a supreme belief in the *one God*. The Druid adored the sun, moon, and stars, and all the sublime works of nature—rocks, trees, torrents, oaks—to which worship Cornwall was peculiarly conducive. That it was Christian when the Saxon invaded it, is proved by the fact of the inhabitants having purchased permission from the invaders to exercise the Christian religion (*Rudborne Chron.*, lib. 2, chap. 1; also *Hist. Mey. Winton. Angl. Sax.*, 1, 187). That Cornish Christianity, like that of Wales, was of Eastern origin is shown by the Passover having been kept on the same day as that on which the Jews held it, and contrary to the Church of Rome. The Cornish continued independent in matters of religion till A.D. 905; the Saxons then held a synod, whereat sundry provisions were made to recover them from their "errors"—that is, their "refusing to acknowledge the Papal authority." (*Rapin. Hist.*, vol. 1, p. 112.) And Usher says (*Hist. Brit. Antiq.*, p. 1152) that they would no more communicate with the Saxons than with Pagans, accounting that of themselves and of the Welsh the only true Christianity. I believe it is generally admitted that the religion of the Nazarene was generally favourably received by the Druids; and it is also known that before its advent they were accustomed to venerate the cross in the form of the tau. One solitary instance of this form remains—in a single upright stone—upon which is an inscription:—"*Cirusius hic jacet, Cunowori filius.*" Mr. Edward Lhuyd fixes the date of this relic in the fifth or sixth century; Mr. Moyle places it in the fourth or fifth. No reason is given why it should not be even earlier. Druidism was of Eastern origin,—and there seems good reason to suppose that it continued its connexion with the East by some remote channel, probably Africa, throughout the Roman dominion. Could Eastern Christianity have passed along the same channel? The tau cross was an Egyptian emblem, and is called the *crux ansata* the key of the Nile, and was thought to be the emblem of life. St. Anthony, who was an Egyptian saint, is shown with it in the Middle Ages. It was also the all-potent sign of the Knights Templars. Mr. Syer Cuming, in a paper read before the British Archæological Association, June, 1867, draws attention to the fact of its still being in use among the Celtic nations, and exhibits a specimen obtained from a Kanture peasant in

Ireland, who could give no further account of it than that it was a favourite form among "certain people" in County Cork. Sir J. Gardner Wilkinson has a passage in his "Ancient Egyptians" (Ed. 1854-1-277) so singularly applicable to this Cornish stone that I give it:—"The origin of the tau I cannot precisely determine; but this curious fact is connected with it in later times, that the early Christians of Egypt adopted it in lieu of the cross, which was afterwards substituted for it, prefixing it to inscriptions in the same manner as the cross in later times, and numerous inscriptions headed by the 'tau' are preserved to the present day in early Christian sepulchres at the great Oasis." Plato, who lived four centuries before the Christian era, advocated an idea of the Trinity, and expressed an opinion that the form of the second person of it was stamped upon the universe in the form of a cross (see "Justin Martyr ad Timeneum," p. 36). St. Augustine even goes so far as to say that it was by means of the Platonic philosophy that he was enabled properly to understand the doctrine of the Trinity. Certainly the T cross is an excellent symbol of the mysterious three in one. Montfaucon, I believe, and several other authorities are of opinion that the earliest cross was that of the T (tau). Mr. Broughton supposes that this was the shape of the cross upon which our Lord suffered. The Samaritans, long before Christianity, are proved to have used the same figure. Another singular feature connected with this subject is that the Egyptian T and *d*, which were interchangable letters, both conveyed the same idea of the Trinity, or three in one co-equal, the *d* being △.

The ancient church of Perranzabuloe, so well known, will soon become a matter of history, for a recent visit shows that exposure is working its rapid annihilation; and not a hand is stretched forth to preserve this interesting memorial of the long-forgotten past. There are, however, several remains of ancient chapels in West Cornwall, which appear to deserve the equal honours of extreme antiquity. One of these is the venerable oratory of St. Gothian on the eastern side of St. Ive's Bay, which, from the rudeness and gaunt character of its masonry, belongs clearly to the earliest ages. No cement is used at all, and no mouldings of any sort are found. Around it many skeletons are buried. At Porth Curnow, near St. Levan Church, on the southern coast of the Land's End district, are the ruins of another of these ancient oratories or chapels. Strange to say, this relic of primitive faith stands upon a tumulus, under which a sepulchral urn was found a few years ago. One of the most satisfactory evidences of the very early date of these rude structures is to be found at the stormy promontory of Cape Cornwall, which is called by Borlase the Promontory of Helenus, the son of Priam, who is said to have come over with the renowned Brutus. The edifice I allude to is called Parc an Chapel, and resembles Perranzabuloe. Near it, and proving its remote antiquity, was found a small stone bearing the famous monogram, the *Chi Rho*. In the same district another example of this is found at St. Phillack. I attach importance to the presence of this holy seal, which we find also at Chedworth, because several antiquaries have, as usual, endeavoured to disprove the great age of Perranzabuloe, and would assign it to the eleventh or twelfth century. Certainly, as far as it is individually concerned, there is no absolute proof of its being built in one century more than another, but there is universal tradition, and that is backed up by the general appearance and character of the work, which is clearly not Mediæval. When to this comes to be added the early Christian seal in close proximity to a similar structure near at hand, the evidence acquires weight. Vestiges of these small rude oratories may be traced in many parts of the Welsh coast, and, as I have before stated, the Cambrian antiquaries give an almost apostolic foundation to many of their churches and monasteries, so much so that one is fain to doubt. Montalembert, in his "Monks of the West," a work which in spite of the beauty of its composition is, in my opinion, very likely to damage the cause of pre-Augustine faith—so mightily does the fabling zeal take the place of historical fact,—states that Ninian (A.D. 370-94), built a little stone church on the peninsular of Galloway, called Candida Casa, or Whitehorn. He also informs us that modern research has discovered and registered as many as ninety churches, whose origin dates from the time of Columba—as many as fifty-three being still traced in Scotland. These rude relics of early piety very much resemble the ruins of Perranzabuloe. It would not be fair to quit Cornwall without a further brief notice of those remarkable stone crosses which the traveller meets at every turn, and of which so little to the purpose has really been said by the learned. Who were the pious masons who chiselled them? The Rev. W. W. Haslam, an excellent Cornish antiquarian, attributes them to the early Christian converts of Britain. I think he is right, although it is important to observe that the character of them differs very greatly, some being the work of men in later ages, who improved upon the ideas of their forefathers, and by degrees introduced the figure of the crucified Redeemer. The earliest forms are those of the Greek cross. Perhaps the Tau stone which I have described may be taken to be the very earliest, and marks the Eastern character of the whole. Some of them partake of the lofty taper outline of the Egyptian obelisk, and, like it, are covered with quaint markings and mysterious Eastern devices. The explanation of them appears to me to be this:—The Druid, before his conversion, was wont to erect stone meni-herion; you see them all over Cornwall. They are but rude prototypes of the stone crosses which succeeded them, and to which the convert transferred his allegiance and his symbolical ideas. This, I think, may be taken as proved by the fact of their being found only in the counties where Druid remains abound, and it was a very natural transition of idea. They abound on the entire western coast, as far north as Angus, where they are very numerous, but of a type later than the Cornish examples. Hallowed relics of the long-forgotten past! how eloquently, yet how silently, do you tell of a rude but pious age! It is very important to remember what Didron says (p. 376) on the subject of the Greek and Latin cross:—"These types were not at first specially confined, the one to the Greek, the other to the Latin church; they were originally common to both countries, and were admitted indifferently by both." Again,—"Still, the most ancient Greek sculptures at Athens, in the Morea, in Macedonia, and in Constantinople, contain crosses with branches of unequal length. That primary type must, therefore, have been known and practised n Greece. As to the second, the cross with equal branches, it is the most commonly adopted by the Greek Church." In Cornwall we have the four forms,—the *Greek*, the *Latin*, and the *Tau* cross, as well as the *Chi Rho*. The two latter symbols are undoubtedly of the Roman period. the two former, very probably, belong to the same age, but not necessarily; one remarkable fact, however, remains to be noticed, and that is, the presence of sculptured figures in tunics, with the arms outstretched, both upon some Latin and Greek crosses: this clearly is the first idea of the crucifix, although according to Didron, p. 259, this emblem was very unusual in the sixth century, and is there mentioned as a novel representation by Gregory of Tours. We are, however, told of a little image which placed itself miraculously upon the cross executed by an artist named Mark, a contemporary of Diocletian era, A.D. 300, which represented not the crucified Saviour, but Emmanuel (see "Labbe Concilium Collectio Maxima," vol. 7, col. 768, second Council of Nice). Images or representations of our Saviour upon the cross were unknown in the early Christian catacombs. I believe it is correctly maintained that to the impure sect of Egyptian Gnostics, we must attribute the early introduction of little images of our Lord. These statues were made of gold or silver, after the heathen pattern of those of Pythagoras, Plato, and Aristotle, who were all honoured with a similar kind of worship,—if we can believe St. Irœneus and St. Epiphanius. We know that the Emperor Alexander Severus placed amongst his Lares figures of Christ and Abraham opposite those of Orpheus and Apollonius. Everything, says Didron, countenances the opinion that "from the commencement of the third century images of Christ were in circulation among the faithful—at least among those of the lower order — and particularly in Rome, where Gnosticism had made many proselytes;"—and, he might have added, Cornwall. The Rev. W. Haslam attributes these figured crosses to the Roman epoch, and he draws attention to one in the parish of St. Buryan, three miles from the Land's End, situated one mile from Churchtown, in a corner of the road running down to some ancient ruins called the "Sanctuary." He thinks the character of this relic is Byzantine and massive, and resembles the few illustrations which remain of early crosses at Constantinople. He tells us, moreover, that the human figure was carved on crosses in the time of Constantine, and he quotes a passage from Lactantius in proof,—I think not very conclusively. Gretzer tells us that the crucifix was in use at the time of Tertullian, but where he obtains his authority is not stated. There are some crosses in Cornwall which represent the human figure in a manner which would lead to belief of its having been added at a later period. At the churchyard, Sancreed, is a very ornamental example, about 6 ft. high: on the side it shows a triangular pattern very common in British jewellery and earthenware; on the face is shown a vase, and what appears to me to be the reed. I would name one illustration of perhaps the earliest and primary form of the Greek Cross, as found in Cornwall; it bears the inscription "Isniocus Vitalis Filius Torrici; in its execution there is not the least deviation from the Roman capitals, two names of the person buried are also given: this is a feature which marks the Roman character of the work, the cross at the top is within a circle; Borlase is surprised to find it on a piece of Roman work; he therefore assumes without any reason that it must have been cut at a later period. We may, in fact, trace the various forms of the cross; from its stern primitive outline to the many florid examples, which were clearly executed in times verging on the Norman Conquest. The Tau of the Druid being converted into a symbol of Christianity, as used on the Nile; then comes the Chi Rho of the times of Constantine and his predecessors, the Greek and Latin forms following on promiscuously through the Middle Ages.

CAIUS GABRIEL CIBBER, OR CIBERT, SCULPTOR.

THE father of Colley Cibber was Caius Gabriel Cibber, or Cibert; he was born in the year 1630, and died in the year 1700.

In the marriage register of St. Giles's-in-the-Fields, London, I had the good fortune to discover the following entry, now for the first time in print:—

"*L. L.* 1670. *Nov.* 24. *Caius Gabriel Cibber, widr.* [*widower*], *and Jane Colley, spinster.*"*

Future historians of the stage, and future writers of lives of actors, will doubtless refer to the columns of the *Builder* for the fact I now bring to light.†

The following extracts are taken from the accounts of the paymaster of the Royal Works at Hampton Court, in King William III.'s reign. The Earl of Portland (William's favourite Bentinck) was superintendent of the works at Hampton Court:—

"Caius Gabriel Cibber, carver, for a great Vauze of white marble, enricht with divers ornaments, with a pedestal of Portland stone, also enricht, 234*l.* More for a great marble Urne, with divers base relieves and figures, 521*l.* 12*s.* In both, 755*l.* 12*s.*"—*Works at Hampton Court*, 1689—1696.‡

"Gabriel Cibber, statuary, for two coats of arms in Portland stone, several statues and figures in metal, and for carriage of the statues and other charges, 530*l.*"—*Works at Hampton Court*, 1691-4.

"Gabriel Cibber, statuary, for insculpting the relievi on the timpan of the great frontispiece with iconological figures, and for several journeys of himself and men to look after the performance, 400*l.*"—*Works at Hampton Court, April 1st*, 1694, *to March 31st*, 1696.

I come now to the works at Kensington Palace:—

"Gabriel Cibber, statuary, for four great flower-pots of Portland stone, richly carved,

* Walpole writes:—"I can only find that he [the sculptor] was twice married." The register quoted above confirms what Walpole believed to be the case. *L. L.* has some reference to a marriage by *licence*.

† The will of the widow of Samuel Cooper, the celebrated miniature painter (died 1672), contains the following entries, now first published:—

"To my nephew and godson, Alexander Pope, my painted china dish, with a silver foot, and a dish to set it in, and, after my sister Elizabeth Turner's decease, all my books, pictures, and medals set in gold.

To my cousin John Hoskins, my husband's portait in crayons, and all my husband's limnings that shall be with me at the time of my decease. Also Sir Peter Lilly's picture in oil." [I wonder much where this can be.]

"My funeral expenses, and the monument over my grave, not to exceed 60*l.*" [Cooper's monument, in old St. Pancras Church, London, was crowned by a palette and brushes.]

‡ This noble vase was removed from Hampton Court to Windsor by King George IV.

187*l.* 10*s.*"—*Works at Kensington Palace, October 1st*, 1691, *to March 31st*, 1696.

The second wife of our sculptor was the daughter of William Colley, Esq., of Glasson, in the county of Rutland, great-grandfather of Sir Anthony Colley.*

At a sale at Sotheby & Wilkinson's, November 27th, 1861, forty-four drawings for sepulchral monuments by Cibber were sold for the insignificant sum of 1*l.* 3*s.*

The Triton Fountain, at Chatsworth, was made in 1688 by our great statuary.†

PETER CUNNINGHAM.

WORKMEN'S REPORTS ON THE PARIS EXHIBITION.

DURING the continuance of the Paris International Exhibition a few members of the "Working Men's Club and Institute Union" (an ugly title that should be changed as soon as possible), who thought it important that means should be devised for enabling British workmen to visit the Exhibition and manufactories in Paris, at a cost which would enable a large number to enjoy that advantage, formed themselves into a committee to effect this object. A report shows that upwards of 3,200 persons availed themselves of the arrangements thus made; and that, including the delegates who went to Paris under the auspices of the Society of Arts, 700 British artisans were enabled to inspect the principal industrial establishments in that city. To render these visits as useful as possible, the committee announced their intention of giving prizes for reports on the branches of industry which the visitors severally represented. A fund of 48*l.* was raised for this purpose and for the printing of such of the reports as might be found worthy of publication. On the recommendation of Mr. Austen H. Layard, M.P., the Committee of Council on Education made a liberal grant to this prize fund, on the condition that copies of the reports should be distributed gratuitously to a certain number of public institutions.

As might have been expected (considering what was being done by the Society of Arts), the committee did not receive a very large number of papers, and the volume published is a small one.‡ It consists of the following reports:—

1. "Pottery and Porcelain." By Thomas Kirkby, Trentham.
2. "Gold and Silver Work." By P. Rasmussen, London.
3. "Educational Appliances." By Henry Major, Nottingham.
4. "Maps and Educational Appliances." By A. T. Greenwood, Congleton.
5. "Preparation of Leather." By Alfred Heswell, Bermondsey.
6. "Watchmaking." By J. E. Bradshaw.
7. "Iron, China, and Ceramic Ware." By John Randall, Salop.
8. "Cabinetwork." By H. D. Hand, Salford.
9. "Cabinetmaking and the Woods employed in it." By C. A. Hooper, London.
10. "Cabinetwork." By Thos. Paterson, London.
11. "Tools and Machinery for the Manufacture of Steel and Iron." By Percy A. Sanguinette, Chatham.
12. "Brickwork and Concrete Building." By — Simpson.

Appendices:—Report of the Paris Excursion Committee; Conditions of the Prize Competition; Rough Notes and Reminiscences of the Committee's Work.

We quote a paragraph from Mr. Hooper's report on "Cabinet Making." Touching polishing:—

"The process of polishing should have some notice in a report upon wood. The niceness of the grain displayed to so much advantage in screens, where 'feathers' and 'curls' of every design are produced, would not exhibit half their beauty were it not for the labour and skill of the polisher. But here there is too often the fault of hurry, and what we call 'scamping' the work. Polishing, to stand in wear, should never be hurried. Without entering into the secrets of the trade I may add that it ought to be repeated at certain intervals, so that the grain may be well filled in before it be finished off, or it will soon expose its deficiency in wear. A piece of good work well polished will always show to the best advantage and will increase in beauty and richness by use if properly attended to. Where there is carving, and the fingers of the polisher cannot apply the rubber, a thin coat of varnish can be applied with a brush so as to put a gloss on it, as it protects the work from dirt and dust which would otherwise so eat into the fine and delicate parts that it could not be removed. Much must in this case depend on the knowledge and skill of the polisher."

The same writer has a lofty notion of the advantages enjoyed by French workmen. He says:—

"I sum up the causes of our decline in trade in this fact, that as workmen we are not encouraged to elevate or improve ourselves, nor are we treated as men who hold responsible positions in the world. We are only 'mechanics' in the common application of the term. No attractions of a rational, refining, elevating nature are generously offered to us. We need look no further for an answer to the question as applied to my own trade, in which so much knowledge and appreciation of art design and skill are necessary, 'where Continental workmen successfully compete with British industry, is it due to superior manipulative skill, or to the adoption of some labour-saving process and more efficient machinery.' It must be evident to every thoughtful observer that their superiority is largely due to their training and education. Higher aspirations are created, better tastes and improved habits are formed. These imbibed in early childhood are afterwards practically exercised in manhood. The workman unites the love of art and the culture of refined taste with the pursuit of his calling in the workshop. This, then, may be said to be the 'more efficient machinery' which is in operation in France, and which I hope to see adopted and brought to bear on us and on our children in liberty-loving England. Across the Channel no obstructions or needless restrictions clog the progress of the workman. There every encouragement is given him by the Government, which concerns itself with industry in the workshops, improved dwellings for the people, and healthful recreation at all times and in all places. The ruling powers in France find their truest policy to be to look to the welfare of the working class—the creators and producers of the nation's wealth."

Well-informed or ill-informed as the reporters may be, we fully endorse Mr. Hodgson Pratt's remark that this volume contains evidence of the healthy mental stimulus which the insight into the social and industrial condition of the French people has given to the minds of our artisans.

Mr. Dexter, who has edited it, explains how it was that the guarantors were called upon to pay a certain amount of the cost of the excursions:—

"They thought that, under all the circumstances, they would be fully justified in securing accommodation for 112 men per week for five months; and if that anticipation had been fully realised, and the beds thus paid for in advance had always been occupied, no loss would have accrued. The slight charge made by the committee to the excursionists over and above their outlay would have covered all the expenses for advertisements, printing, office, &c. However, the result in point of fact was that, while the committee had to engage a great amount of extra accommodation in August, to the extent sometimes of 200 beds a week, in the two last months of the season a very large number of their 112 beds were every week unoccupied."

Hence the deficiency.

THE TWO BRIDGES.*

"God's blessing on the architects who build
The bridges 'cross deep rivers and abysses,
Else all impassable to human feet."

LONGFELLOW.

1848.

I STOOD in London, on Westminster Bridge,
Old Labellye's camel-bridge, with hump awry:—
A half-built palace creeps up on one ridge,
Vast fragrant mud-banks greet the nose and eye.
On either bank what can sad Taste descry
But dreary, doleful roofs, eyesores a hundred,
A miser mass and wretched rookery?
So that, for ages, Seine-bred minds have wonder'd
How sane John Bull could e'er have so insanely blunder'd.

1868.

Again upon Westminster Bridge I stand,
The unrivall'd span of many-bridged Page,
A joy of Art for every coming age.
Where, now, a stately path margins the Strand,
And, in the mind's eye, structures may be scann'd,
Fitting such site (all slimy late, and slobbery),
By grateful labour hewn—by genius plann'd.
Forbid it, Art! that interloping jobbery
Lay on this golden chance the hand of greed and robbery!

B.

STONE-WORKING MACHINERY.

MESSRS. ROTHEROE & BASTIN are now sending out machinery which has the effect of cheapening very considerably the production of good masonry. We have examined the machines as set up for Messrs. Holland & Hannen, behind the fine houses they are erecting at Grosvenor-gardens, on the Marquis of Westminster's estate. These are three in number, and are respectively for sawing, surfacing, and moulding stone. The saw-frames are each capable of taking in blocks measuring 9 ft. one way, 7 ft. the other, and 4 ft. 6 in. thick, and cutting them into any required thicknesses. They are made of wrought iron, and have an arrangement for connecting with saw-tillers and cotters; they are suspended by suitable chains, links, &c., supported and working into grooved pullies, fitted with adjustment so as to regulate the speed of the saws according to the quality and character of the stone, also a proper arrangement for removing the frames entirely up out of blocks of stone. The motion of the saw-frames is horizontal.

The planing and moulding machine has two tool-boxes, carrying where necessary four tools, and is so constructed that the tools cut both in and out travel of machin e. The planing and mould ing, therefore, can be carried on at the same time, either together or separately, and two or three pieces of stone may be operated upon in one machine. The tool-holders are arranged so as to receive the cutters according to any required design.

The surfacing or rubbing machine consists of a cast-iron bed-frame, having a revolving top of 9 ft. diameter (it may be larger), the metal in which is very carefully selected and prepared. Proper arrangements are made in the framing, so that the upper surface of revolving plate can be easily adjusted. A small crab-winch is fitted to the framing for shifting and removing stones from the table. This seems a particularly useful machine.

The power for driving these machines and a circular-saw rope feeding-bench is supplied by a 12-horse power engine.

The manager of the works where these have been set up (Mr. Pyle) speaks highly of them as the result of his experience, and considers the saving effected fully 60 *per cent.*, as compared with the results of hand-labour. It seems clear that for large operations this machinery may be used with advantage.

SMOKE PREVENTION AT HANLEY.

AN inquiry into the subject of the prevention of smoke, directed by the Secretary of State, has been held at Hanley, in pursuance of a requisition by a large number of the principal inhabitants. The inquiry was held in the townhall, before Mr. R. Rawlinson, C.B. At an adjourned meeting, Mr. M'Mahon said since the commissioner last sat, the town council had done all that he then suggested. They had appointed a smoke inspector, who had made and recorded a great number of facts repecting the smoke produced in the borough. The council, acting on his report, had served notices upon a number of manufacturers, and in six cases, these notices not having had the desired effect, summonses had been issued. The Act left the decision of cases of this kind entirely in the hands of the magistrates. The commissioner said he was quite prepared to admit that time must be allowed to the town council. Nothing would be required from them which was unreasonable, impracticable, or opposed to common sense. It might take weeks or months to make all the alterations required. He believed that the necessary reform would be one of slow growth, and he hoped the council would proceed in a conciliatory spirit, and that goodwill would be displayed on both sides. The law required the local authority to see that no one carried on his business ignorantly or wilfully to the injury of his neighbour, but the law did not require any man to do that which was scientifically impossible. To show what might be done, he mentioned that since Lord Derby's Act came into operation for preventing nuisance from alkali works, and limiting the escape of vapours to 5 per cent., there were some manufacturers who did not allow 1 per cent. to escape, and the average was much less than 5 per cent. After further procedure, including a good deal of evidence on the subject in question, the commissioner said he thought the course taken would be the means of doing good, and had no doubt that in future generations, when the various processes of manufacture had been brought to a degree of perfection which could not yet be claimed for them, people would look back with wonder at the evils and nuisances which had to be endured. He had no doubt that a large proportion of the smoke nuisance might be prevented, and if gentlemen would set to work and do what ought to be done in this matter they would not only set a good example to the country, but would render it unnecessary for the Secretary of State to interfere.

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* Lysons's Environs of London (St. George's-in-the-East), ii. 437.

† See the late accomplished Duke of Devonshire's "Handbook of Chatsworth," privately printed by the duke a little before his death. Three days before the duke died I had a note of invitation from Sir Joseph Paxton, written at the request of the duke, that I should arrange and catalogue his portraits at Chatsworth and Hardwick.

‡ "Modern Industries: a Series of Reports on Industry and Manufactures as represented in the Paris Exposition in 1867." By Twelve British Workmen, visiting Paris under the auspices of the Paris Excursion Committee. London: Macmillan & Co., 1868.

* Suggested by the essay in the *Builder*, p. 581, *ante*, on "The Future Architectural Rank of London among European Cities."

LEICESTERSHIRE ARCHITECTURAL AND ARCHÆOLOGICAL SOCIETY.

THE general annual meeting of this society was held this year at Kegworth. The members and their friends assembled at the Mechanics' Institute, and proceeded thence to the church, at which the Litany was read by the Rev. Jos. Clarke, M.A., rector of the place. After service Mr. M. H. Bloxam descanted upon the architectural features of the church.

The inspection having been concluded, the party proceeded to the museum of antiquities and other objects of interest, which were arranged in the school-room of the village. In the afternoon a party visited Kingston Church. At six o'clock a dinner took place at the Flying Horse, at which the Rev. J. Clarke presided.

At half-past seven in the evening a public meeting was held in the Mechanics' Institute, which was completely crowded on the occasion. The chair was occupied by the rector.

The chairman, in opening the proceedings, read a note from the Ven. Archdeacon Fearon, regretting that he could not be present, on account of the death of the Bishop of Peterborough. He then read a paper, entitled "Memorials of Kegworth."

Mr. Bloxam then proceeded to read a paper, "On some Discoveries made in the Progress of the Restoration of Lutterworth;" and the Rev. E. Tower one entitled "Richard Fowke's Journey to Freeston Shore, illustrative of Social Life amongst the Middle Classes at the Commencement of this Century."

Mr. Thompson not being present, owing to ill-health, a paper announced by him, "On the Objects of the Leicestershire Architectural and Archæological Society," was not given, but in lieu of it Mr. North read a short paper on the same subject.

A vote of thanks was unanimously accorded by the meeting to the society for coming to meet at Kegworth, and a hope was expressed that at no distant date they would come again.

The excursion took place the following day. A good deal of rain had fallen in the night, but the morning proved remarkably fine and the party enjoyed an extremely pleasant drive through a varied country. The next stage was Bunney, and the company successively visited the churches of Wysall, Willoughby, Wymeswold, Rempstone, Costock or Cortlingstock, East Leake, and West Leake; Mr. Bloxam making occasional remarks as they went along. The party then returned to Kegworth, and there separated.

SCHOOLS OF ART.

The Dorchester School.—The first public meeting for the distribution of prizes in connexion with this school has been held. The meeting was convened at the Shire-hall, and was attended by a large company of the friends and supporters of the institution. The attempt to establish a school for promoting a love and taste for the fine arts in Dorchester has been attended with gratifying success. The chair was occupied by Mr. John Floyer, M.P. for Dorset, and president of the school. The prize drawings were suspended around the hall, and proved a source of interest to the visitors, by whom they were inspected before and after the meeting. The President, in opening the proceedings, spoke in terms of congratulation and encouragement. He said: We have not achieved, I believe, any very brilliant success, but we have achieved at least as much as we expected, and perhaps almost as much as we could have hoped for. I am informed that the classes have been very fairly attended. That designed especially for operatives has not been so fully attended as we could have wished, but still there has been a tolerable attendance even in that class, and I am informed that the results of their studies and their works are of a very satisfactory description. Mr. Dewar Campbell, the master of the school, said there were very few of the students, possibly none, who fell short of the average; and there were many whose talents raised them above the level of mediocrity. There were some few who might attain to any point of excellence which their ambition proposed to them; but which their perseverance in study must second. In reference to the Government awards, he thought that when the annual report reached them they would find they occupied a very respectable position among the schools of the country.

The Bridport School.—This school is conducted by the same master as the Dorchester school. The second session has been commenced, on which occasion the various works of the most meritorious students were exhibited in the lecture-room of the Literary and Scientific Institute. The prizes were distributed by Mr. T. A. Mitchell, M.P., and the room was filled with not only students, but most of the leading gentry of the town and neighbourhood.

CONGRESS OF GERMAN ARCHITECTS AND ENGINEERS.

THE following is the programme for the fifteenth annual meeting which this year assembles at Hamburg, as we advised our readers some time ago. August 31st, first *Conversazione* in a pavilion specially erected in the centre of the "Alster" Basin. September 1st, Sessions, general and in sections, after which visits to the principal objects of interest in the city; then a steam trip down the Elbe. In the evening a special representation at one of the theatres. September 2nd, Breakfast at the Zoological Gardens; at ten a meeting in the Arts Gallery; at two p.m. inspection of the new mail steamship *Cimbria*, and trip down to Blankenese, where dinner will be provided. In the evening second *conversazione*, concert, and fireworks. September 3rd, to Lubeck and back. September 4th, Sessions during the morning and the last *conversazione* in the evening. For those who can remain a few days longer, various excursions to Kiel, Heligoland, &c., have been organized.

PROVINCIAL NEWS.

Rochester and Chatham.—The whole of the alterations and improvements ordered by the corporation to be carried out at the Guildhall having been completed, the building, together with the council-chamber adjoining, have both been re-opened, after being closed for several months. The carved ceiling has been entirely restored, while the whole of the full-length portraits of the ancient city worthies on the walls, including Sir Godfrey Kneller's portrait of King William III., recently valued at 800 guineas, have all been restored. The interior of the hall is lighted by a series of sun-light burners in the centre of the ceiling. The whole of the alterations and improvements have been carried out under the superintendence of Mr. H. Andrews, the corporation surveyor.

Bury.—The laying of the corner-stone of the castle and armoury of the drill-hall now in course of erection at Bury, for the 8th Lancashire Rifle Volunteers, was made the occasion of great rejoicing in that town. The estimated cost of the whole will amount to between 2,500*l.* and 3,000*l.*, and up to the present time 1,800*l.* have been subscribed. The building is erected on the site of the old Bury Castle, and will consist of a large drill-hall, a strong room for the safe custody of arms, a guard-room, an orderly-room, a reading-room and meeting-room for the privates, a non-commissioned officers' room, and a dwelling-house for the drill-instructor. The building will be of brick, with a stone front, in the castellated style. The drill-hall is 108 ft. long by 70 ft. broad, and 20 ft. high. This hall was opened in November last, and since then has been made use of for drilling in. The head-quarters have been completed as far as the first story. Messrs. Farrer & Styam, of Manchester and Bury, are the architects; and Mr. John Hall the builder of the head-quarters.

Newcastle-upon-Tyne.—The new premises of Messrs. George Angus & Co., leather and gutta-percha manufacturers and merchants, situated in Grainger-street West, a new street that promises to add to the architectural features of Newcastle, have been formally opened by the mayor (Mr. H. Angus) in the presence of a large assemblage. Grainger-street West is to take the place of a wretched and dilapidated street known as St. John's-lane, extending from the Bigg Market to Westgate-street. This new street constitutes a part of the much-needed improvements projected by the corporation, and it is contemplated by the original designs to prosecute the work of improvement until an almost straight and wide thoroughfare stretches between the Central Railway station on the south-west and the Grey Monument on the north-east. The work, as a whole, has come to be designated the "St. John's-lane Improvements." The new building for Messrs. Angus & Co, situated on the north-east of the Savings Bank, occupies an area of 3,000 square yards. There are also 600 square yards adjoining, which can be built upon when necessary. It is three stories in height. At the rear are three floors, one above another, each having an area of 90 ft. in length and 45 ft. in width. The upper story will be used as a manufactory, and the other two as warehouses. The front shops will be used for the India-rubber and gutta percha business of Messrs. Angus & Co., and the upper stories will be let chiefly for office purposes. Not far from the building are large tannery works, formerly belonging to Alderman Sillick, and here the firm are about to erect extensive machinery for the manufacture of hose belts. The façade of the building is about 90 ft. in length. The style of architecture is French Gothic. Over the principal entrance is a carved bull's head—the crest of the firm. The stone of which the building consists was obtained from the Wideopen and Brunton quarries. The architect was Mr. Gibson Kyle; Mr. Curry did the carving; Mr. W. Robson was the builder; Messrs. J. & W. Lowrey had the contract for the carpenter work; the plumber was Mr. Watson, of the High Bridge; Mr. Richardson, Clayton-street, did the painting and decorating; and Mr. Charlton was the plasterer.

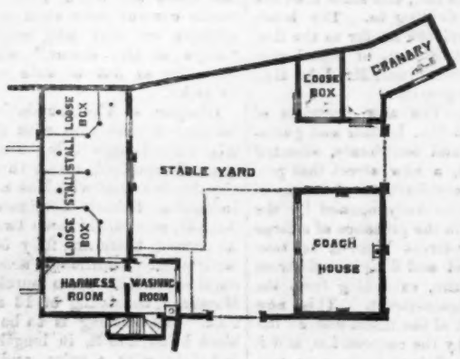
FROM SCOTLAND.

Edinburgh.—The alterations and improvements in the Antiquarian Museum of the Royal Institution, which have been in progress since the opening of the year, are being pushed forward. The floor has been lowered 2 ft. 8 in., to Playfair's original design, and the effect of this alteration, according to the *Scotsman*, is a marked improvement in the appearance of the hall. The joinering work is now finished, and the curator is engaged in re-arranging the collection. The heavy upright cases have all been let down from their old position against the walls by means of pulleys, and are now on the new floor.——The building operations in connexion with the new market in Prince's-street are progressing with rapidity. The bulk of the mason work is now nearly finished, the only remaining portion of the rubble building yet to do being the walls at the south-west end of the area to be occupied by the market. The ashlar coping and pavement, &c., in Prince's-street, probably will not be laid until the early part of next year, as it is desirable that the embankment put in behind the heavy retaining wall should be as much consolidated as possible previously, in order to prevent subsidence. The old building known as Trotter's Warerooms is about to be removed.

Portobello.—The road-steamer has been at work here almost daily. It has run at a high speed over the wet soft sand of the seashore as far as Joppa, and then, wheeling round, returned at a still higher speed. It ran with great ease and perfect steadiness eight and ten miles per hour. The indiarubber wheel-tires run over sand, whether wet and soft or dry and loose, with equal facility, making only the merest trace of a track, scarcely ever so deep as one inch, and generally not exceeding half that depth. This power of running over loose sand is one which, it is believed, will give Mr. Thomson's invention great value in many countries where the roads are often little better than mere tracks covered with sand or earth; and such vehicles, we may add, may yet be the true "ships of the desert," when the camel is set aside as out of date and antiquated, as he looks.

Glasgow. — The foundation stone of a new building in connexion with the Glasgow Industrial Schools now being erected at Mossbank, near Hogganfield, about three miles from the city, has been laid with Masonic ceremonial. The Industrial Schools originated in the Ragged Schools, established some twenty-one years ago. At present there are fully 500 children in the institution. Additional accommodation being required, the directors purchased the farm of Mossbank, consisting of 13 acres, at a cost of 900*l.* The building is to be of red, white, and black brick, 240 ft. in length, and three stories in height, with a spire, and will contain about one thousand children. The foundation stone was laid by the Earl of Dalhousie, Grand Master Mason of Scotland.

CONCRETE AND FACING BLOCKS: DETAILS OF CONSTRUCTION.

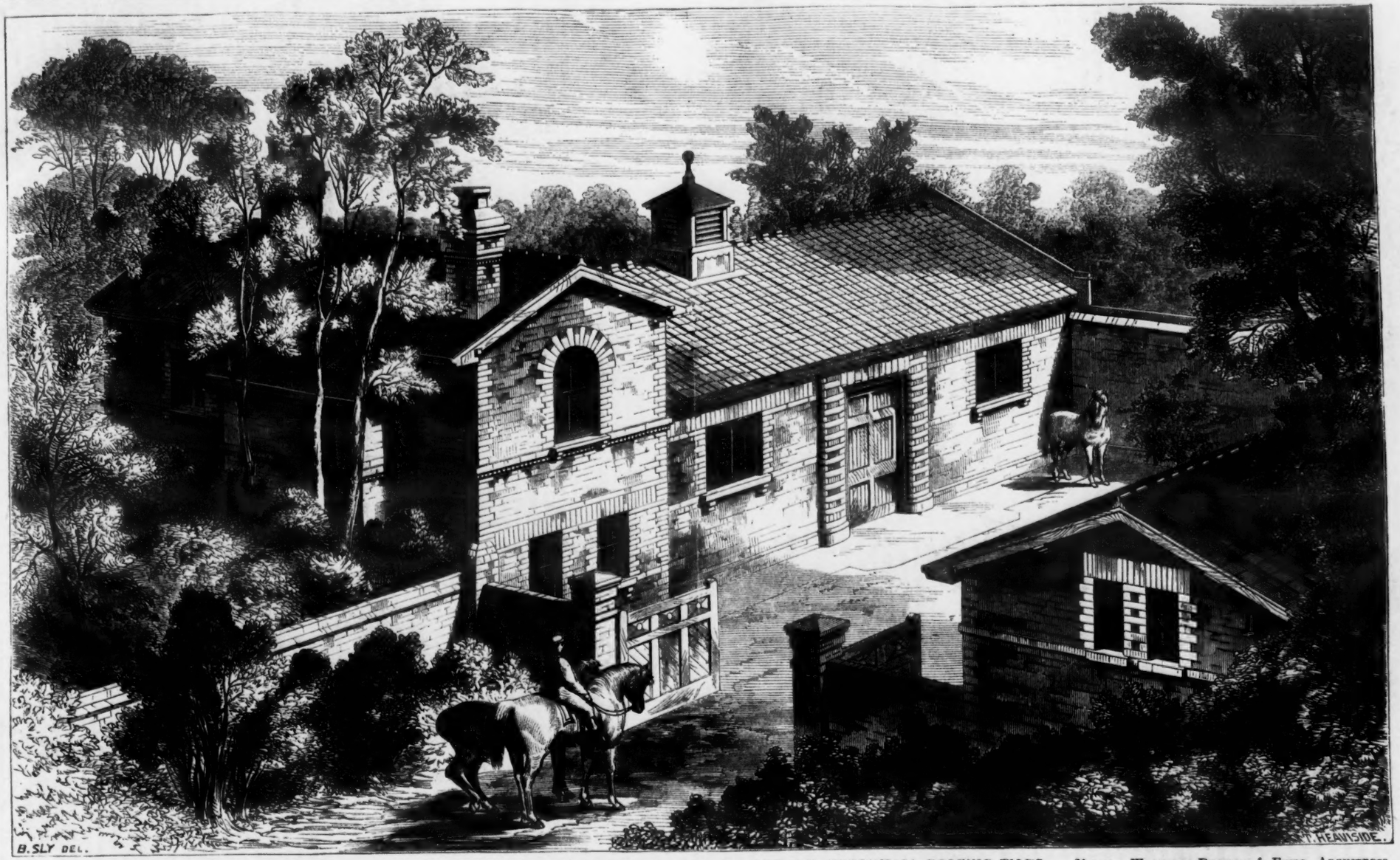


Plan of Stables and Coach-house, Horsham Lodge, Walton.

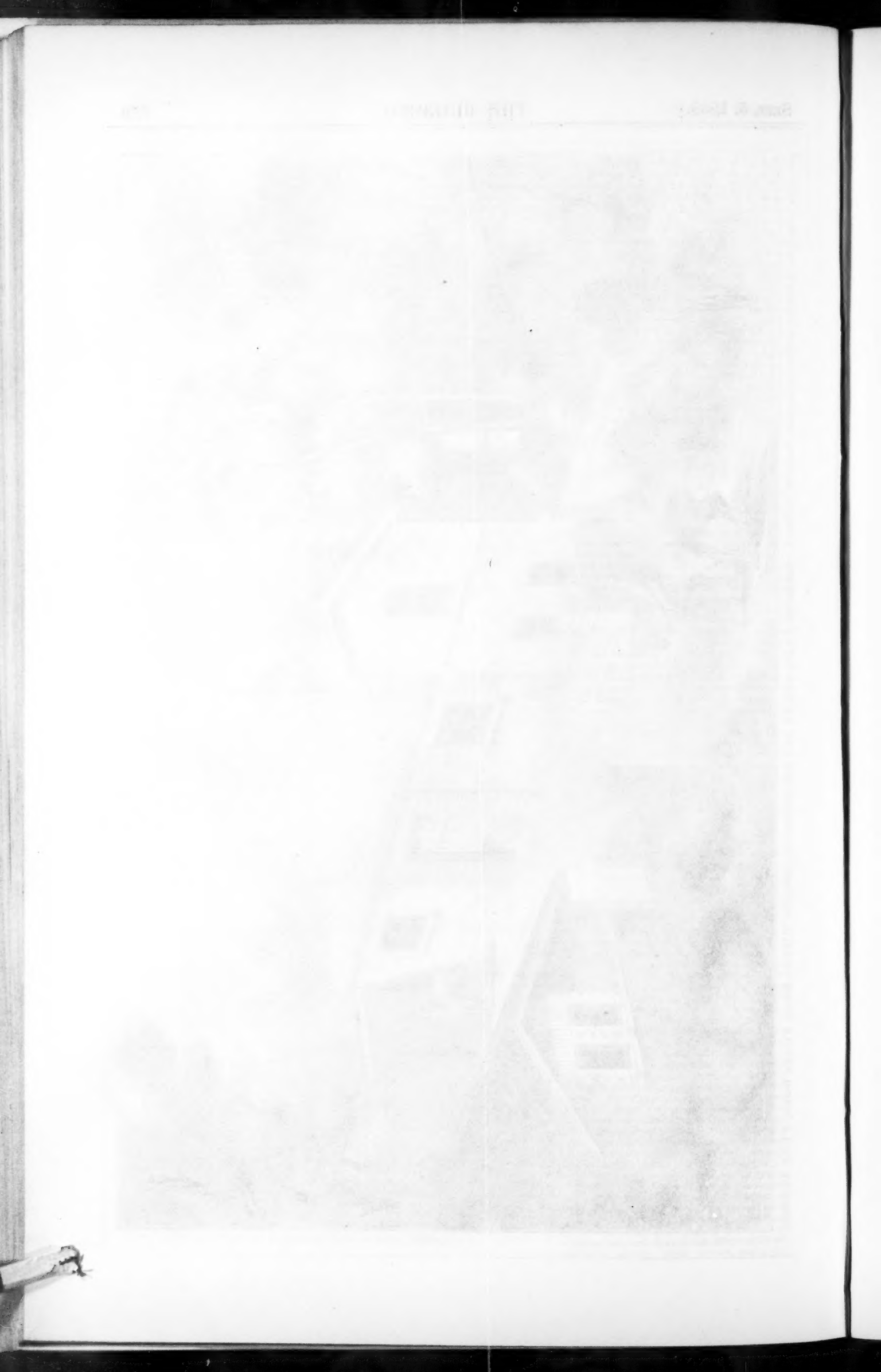
STABLES, WALTON, SURREY.

NEW MODES OF CONSTRUCTION.

MANY ingenious efforts are being made to bring again into use the principles of building in concrete with a view to economy and strength, to some of which modes we have already drawn attention. In our present number we give illustrations of some new stables and outbuildings recently erected at Horsham Lodge, Walton, Surrey, for Mr. B. Barton, upon a plan which seeks to overcome the disadvantage of a rough external surface by the use of a facing block; a detail of the working of which we annex. These angle facings are 12 in. long made in pairs, separable by a blow, and are used as blocks to any thickness of wall; the interspace being filled up by the labourers with concrete, course by course. With *lime*-concrete it would be necessary to guard against the effects of its expansion in setting. Using *cement*, the archi-



STABLES AND COACH-HOUSE, HERSHAM LODGE, WALTON, SURREY. CONCRETE FACING BLOCKS, AND THE BROOMHALL ROOFING TILES.—MESSRS. WALFORD, DONKIN, & EVILL, ARCHITECTS.



tects say no inconvenience of this kind was found.

We understand from the architects that the cost is from 8*l.* 10*s.* to 9*l.* 15*s.* per rod, reduced; according to the facilities of getting gravel or burnt ballast. The thicker the walls the greater the saving.

These blocks were obtained at the Broomhall Tile Company's wharf at 45*s.* per 1,000. The roof is covered with patent tiles from the same firm.*

A few points in the detail of the building are, perhaps, worthy of notice.

The coach-house doors are fitted with Messrs. Clark's patent revolving shutters in lieu of folding gates; the other external doors are suspended and slide upon a bar against the wall. A ventilator, constructed in wood, with plate-glass louvres and top, provides for lighting as well as ventilating the stable. The internal fittings are all of wrought-iron from the St. Pancras Iron Works, and the building generally is fitted up in a very complete manner.

Messrs. Walford, Donkin, & Evill were the architects; Mr. Ingram was the builder. The total cost will be about 1,000*l.*

COURTS OF CONCILIATION AND ARBITRATION.

THE manufacturers and operatives of the Staffordshire potteries have just formed a court of conciliation and arbitration for the settlement of disputes in the pottery trade, consisting of ten employers and ten workmen. The operative members of the court were appointed at a large and enthusiastic meeting of potters at the town-hall, Hanley, at which Mr. J. Ashford Wise, formerly M.P. for Stafford, presided. Mr. Wise said he anticipated the happiest results from the adoption of the principle of conciliation and arbitration. Courts of conciliation, he said, existed in ancient Greece and Rome, and had been in operation since 1803 in France, where there were eighty boards of conciliation and arbitration. In the last few years no less than 174,487 trade disputes had been settled by the lesser court, which consisted of four members, leaving nearly 10,000 for the decision of the larger or Arbitration Board; but when it was found that these 10,000 cases could not be settled by the court of conciliation, 4,589 were withdrawn, and only 5,178 went before the higher tribunal. These courts worked well in Belgium, but had been most successful in Denmark and Norway, where the principle had been applied not only to trade purposes, but to a settlement of differences in private life. Three years before the establishment of these courts there were 25,000 cases for the lawyers, but in the year following their formation there were but 9,000. The time had come for legislation on this question in England, and then submission on one side and dictation on the other must cease.

THE TELEGRAPH ACT.

THE statute passed on the day of the prorogation to enable Her Majesty's Postmaster-General to acquire, work, and maintain electric-telegraphs, is an important measure. In twenty-four sections the preamble is worked out. The uniform rate, subject to regulation, of messages throughout the United Kingdom, and without regard to distance, is to be not exceeding 1*s.* for the first twenty words, and not exceeding 3*d.* for each additional five words, or part of five words. The Postmaster-General is now authorized, with the consent of the Treasury, "out of any moneys which may be from time to time appropriated by Act of Parliament, and put at his disposal for that purpose, to purchase for the purposes of this Act the whole or such parts as he shall think fit of the undertaking of any company." Telegraph companies are empowered to sell their undertaking, under certain conditions specified, with a provision as to the appointments of their servants by the Government, or compensation by way of annuity. The Postmaster-General is to enter into contracts with certain railway companies mentioned in the Act, and very specific directions are given as to such acquisition. The Postmaster-General is to transmit to their destination all messages of a railway company in any way relating to the business of the company in the United Kingdom free of charge. All matters of difference between the Postmaster-General and railway companies are to be settled by arbitration. There are provisions in the statute to enable the Postmaster to acquire the right of way over canals. It is constituted a misdemeanour in any person having official duties to disclose or to intercept messages. In the schedule annexed to the Act, thirteen agreements with railways and telegraph companies are referred to, subject to the approbation of Parliament; and it declares it to be expedient that agreements should be made with other railways set forth, including the metropolitan districts. Three months' notice is to be given by the Postmaster-General to the companies. By the statute the Postmaster-General, with the approbation of the Treasury, can purchase the undertakings of telegraph companies.

* Of these tiles, which cost 5*l.* 5*s.* per 1,000, the company say, 185 cover 100 ft. superficial; 2,000 of them weigh about 2 tons. Proper ridge and hip tiles form part of the arrangement.

AMERICAN ANTIQUITIES.

WE are told of some discoveries recently made by railway surveyors on the banks of the Little Colorado river, in the territory of Arizona; walls of buildings still 8 ft. or 9 ft. high, irrigating canals, and the ruins of a castle, of which the walls are still 30 ft. high. The ruined buildings are of hewn stone. A paper recently read at a meeting of the American Association for the Advancement of Science, held in Chicago, on the "Geological Evidences of Man's Antiquity in the United States," maintained that four American races preceded the red man: first, the mound-builders; second, a race in the territory now called Wisconsin; third, a warlike race in the region south of Lakes Ontario and Erie; and, fourth, a religious people in Mexico. Pottery, arrow-heads, &c., have been found, the writer said, in conjunction with and beneath the mastodon and megatherium. While Dr. Hooker has been drawing public attention to a race who erect dolmens, &c., in India, Mr. Squiers has been photographing ancient dolmens in Peru! The sitting posture in which the dead were anciently placed in Mexico and elsewhere in America, too, is interesting in connexion with the ancient "old world" races who also buried their dead in a sitting posture.

THE REMAINS OF WILLIAM RUFUS IN WINCHESTER CATHEDRAL.

IT being very desirable to remove the Rufus sarcophagus from its inconvenient position, between the north and south doors of the choir and near the altar, the dean and chapter resolved to do so if the sarcophagus were found to contain no human remains, as was believed to be the case. It was, therefore, opened, but the almost entire skeleton of a man of about 5 ft. 9 in. in height was found in it; so that in all probability the legend that Cromwell's soldiers abstracted the bones to throw them at the windows is untrue. The authorities, therefore, have resolved to allow the sarcophagus to remain where it is, unless it can be established that its present position is not its original one, as is also believed. Besides the bones, the sarcophagus contained fragments of corroded lead, a few morsels of gold tissue, and a turquoise stone, probably the remains of a ring, and a small ivory carving. The tomb had seemingly been rifled of a lead coffin, gold embroidered cloth, &c., but the skeleton is thought to be that of Rufus.

MONUMENTAL.

Statue of Duke of Cumberland in Cavendish-square.—This equestrian statue, which stands upon its stone pedestal in the centre of the enclosure, and which was erected in 1770, has become so dilapidated that it is about to be taken down to be recast.

Tomb in Southampton Cemetery.—A tomb has just been erected in memory of the late Mr. Councillor Bull, from the design of Mr. C. A. Monday, of Southampton, architect. The style is Gothic, of the latter part of thirteenth century. The memorial is arranged for a family tomb. Above the base, the whole of the work except the columns is executed in Portland stone. Above the York stone base is a stone plinth, relieved by ornamental sinkings in the stone-work; above this, each side of the tomb is divided into four panels, and each end into two panels, by polished granite columns and stone caps and bosses, carved with conventional foliage. These columns, caps, and bosses support a series of intersecting arches. The angles of the tomb have octagonal shafts. The whole is surmounted by a moulded cornice, in which is introduced the tooth ornament. The top stone is in one piece, and over 10 ft. long and 4 ft. wide. The whole of the work was executed in the stone-yard of the firm established by the late Mr. Joseph Bull.

Memorial of Alexander III. of Scotland.—A public meeting has been held in the Town-hall, Burntisland, Fifeshire, for the purpose of considering the propriety of erecting a memorial of Alexander III. Mr. Roger Sinclair Aytoun, M.P., occupied the chair. Mr. George Seton, Advocate, Edinburgh, moved, and it was unanimously resolved:—"That a tablet, Celtic cross, or cairn, be erected to the memory of Alexander III., on the 'King's Rock,' between Burntisland and Kinghorn, being the spot to which the body and horse of the king are believed to have rolled after falling over the cliffs above." A committee was appointed to carry out the object of the meeting. A design, in the form of a Celtic cross, has been prepared for the committee by Mr. M'Glashan, sculptor. Were Scotsmen to erect a series of statues or other memorials of their old kings, as Parliament has done of old English kings at Westminster Palace, good and well; but it seems an odd movement this, to commemorate one of the old Scottish kings who is already better remembered than others who perhaps better deserve remembrance.

Statue of Napoleon I. at Grenoble.—The new statue, on the Place d'Armes, has been inaugurated in the presence of the troops forming the garrison and of an immense concourse of the population. Senator Larrabit, who had arrived expressly from Paris, presided. In the evening there was a grand banquet, and fireworks followed.

FROM IRELAND.

Belfast.—The foundation-stone of the new Wesleyan chapel, Coote-hill, has been laid. The site chosen for the new building is about midway on the left down Bridge-street, and opposite the old building. It is an oblong building, 54 ft. in length by 31 ft. in breadth. The architect is Mr. Hallam, of Rockcorry. It is designed to accommodate about 250. It will contain two aisles, without either gallery or pulpit: for the latter there will be a raised dais or platform. The old preaching-house will be converted into a school-house in connexion with the chapel; and it is also in contemplation to build a residence for the minister.

INDIAN AND CELTIC MONUMENTS.

SIR,—In reading a notice of Mr. Fergusson's paper on "Buddhist Architecture" in the *Builder* of the 29th ult., and a paper on "The Tinnevelly Pearl Fishery," by Mr. Markham, as well as other papers relating to India, I have observed an identity in sound and meaning of many words both in the Indian and Gaelic or Celtic languages. Mr. Markham in his paper on "The Pearl Fishery of Tinnevelly," read before the Society of Arts, says,—"The head-quarters of the fishery were then, and, indeed, from the days of Ptolemy to the seventeenth century, continued to be, at Choyle, or Coyl, or Sael, as Barbosa has it, literally 'the temple.'" Here we have the word *choyl*, or *coyl*, almost identical in sound and perfectly identical in meaning with the Gaelic word *kille*, or *kil*, a church or temple, the *i* having the long sound as in kine. This word *kille*, or *kil*, forms the prefix to the names of many places in Ireland, Scotland, and Wales. If we give *ch* the soft sound in the word *choyl*, it will sound nearly like *sael*, as Barbosa has it, which word *sael* sounds very much like *gael*, by giving *g* its soft sound, or that of *j*; so that the Choyltic, Gaeltic, Saeltic, Keltic, and Celtic people originally meant a temple-going or church-going people. Take, again, the word Brahmin or Brahmane, as the French spell it. The first syllable *Brah* is evidently identical in sound with the Gaelic word *Bragh*, which means ever, or everlasting, and the word *mane* signifies spirit; so that the

compound word Brahmin or Brahmane literally means "everlasting spirit."

Mr. Fergusson states in his paper that "he did not say that people came over from India and taught the people of this country to erect Stonehenge, nor that they had any connexion with the people of India; yet there was this great underlying stratum of population, who cropped up in Europe and other parts of the world as well as in Asia, and wherever they came to the surface their monuments were similar in character, and all more or less applied to the same purpose. Originally funereal, they gradually became temples and relic shrines; but they were all monuments of one great people, and all expressed more or less distinctly one idea. He was convinced that when this subject was fully investigated they would have a very interesting picture of a people who were now only known by their rude monuments all over the globe."

The subject here referred to by Mr. Fergusson is certainly a most interesting one for investigation, and may—considering our present and future relations with India—prove most useful and profitable. I am quite convinced that a knowledge of the Gaelic, Celtic, or old Irish language, together with a knowledge of the structure of what are called Druidical altars and temples, will be found to facilitate the investigation. For instance, near Leeds there is a Druidical altar called "Brimham Rocks," the structure of which resembles Stonehenge. Apart from any ideas that may be suggested by the structure of Brimham Rocks, the very name affords evidence of the most convincing kind, that those who placed these Rocks in position held one and the same religion with the Indian worshippers of the god Brimha. This god is not to be confounded with another god worshipped in India called Brahma or Bramha. Brimha, according to Indian theology, is the only eternal, omnipotent, and self-existent god. Having been solitary and alone in the universe, he resolved within himself to create a goddess, who, in the process of time, laid three eggs, from which the three gods Brahma, Vishnu, and Siva were developed.

E. NUGENT, C.E.

THE SCIENCE OF COLOUR.

I HAVE read through, several times with care, Mr. Benson's long letter in the last number of the *Builder*, in support of his theory on colour, but I only become more mystified instead of being enlightened. For I am informed that "blue and yellow would always most provokingly produce a neutral grey." (Mr. Benson must have used very bad colours.) That green added to red makes yellow, and that, by adding blue, yellow is converted into white! Really I must confess that I do not understand this; and if Mr. Benson were not an earnest observer, as I have every reason to believe he is, I should be tempted to say that it was simply ridiculous.

In Mr. Benson's own experiment, which he says answers the first part of my letter, although I fail to see how, if his papers are looked at diagonally with the prism, the yellow ray will be brought across the blue at the corner where the papers touch, and a brilliant green is the result; showing, as I said in my former letter, that "green is immediately formed by allowing the yellow to approach the blue ray." Indeed, Mr. Benson himself shows this is the case, when he says "that green appears when the white space is so narrow that the red in its spectrum no longer overlaps the green." Just so; but the yellow which comes next the red overlaps the blue and forms green. This is easily seen by widening the white line until you separate the yellow from the blue, when you have no longer any green.

As to my other illustrations upon the formation of green in nature, Mr. Benson simply shirks them, and fails either to explain or controvert them. He says that, if sky-green were formed as I say it is, it "would be darker than the sky-blue." How does Mr. Benson know that it is not? We cannot see the blue which is beyond except through the yellow medium, therefore we cannot compare the one with the other to know which is lightest or darkest. It is a very simple phenomenon, and very easily accounted for, in the same way that the more homely one may be of bringing a piece of blue paper under the influence of candle-light, when every one will exclaim that the paper is green, and not blue.

Again, I am told that I "am under a mistake as to the nature of the colour of the greens of vegetation." But I beg to say that Mr. Benson wholly misunderstands my illustration, the object of which is simply to show that green is a secondary colour and not a primary. I assert as a fact, that the foliage in the bud, before it is exposed to the atmosphere, is *yellow*, that it becomes of a greenish hue when it first bursts forth, and that it gradually becomes greener and greener, until it assumes, when fully developed, a dark blue green, all of which is gradually brought about by the chemical addition of *blue*, in some way, from the atmosphere, added to the normal *yellow* colour of the plant;—that the leaf again loses the *blue*, and falls in autumn, as in the case of the willow, *yellow*; thus illustrating, by the aid of nature, that green is a compound colour formed of blue and yellow; and to deny it Mr. Benson might as well deny that two and two make four. As to the nature of greens, whether they are yellow greens, or that "the light they reflect or transmit to the eye is red," is altogether beside the question. The variety of greens in nature is something positively wonderful.

Respecting the blue, the actinic or chemical ray, which is mostly in excess in spring, the yellow in summer, and the red, or ripening ray in autumn, that requires no observation of mine, as it is now well understood by all botanists, and that the sun's rays differ very perceptibly according to the moisture or dryness of the atmosphere. It is a question whether what we call white light exists at all; probably the term is only comparative, and that we view everything, more or less, through a coloured medium according to circumstances.

JAMES K. COLLING.

CHURCH POLYCHROMY.

YOUR correspondent "R. C. H." evidently wants information as to distemper colouring, for I believe there is no other kind of decoration which can be produced at so little cost. All he would require for this would be, say, for a dado round a chancel, half a pail of whiting (whiting and size), a potful of weak size, a pail of clean water, half a dozen pots, a piece of board, a straight-edge, a few painters' tools and fitches, and the requisite dry-ground colours. He would have his pattern, and should cut his stencil-plates out of cartridge-paper and then oil them. To mix the colours he should put a quantity of the whiting into his pot, and make it of a proper consistency to work with by adding clean water; then put in his dry colours. He should try his colours on a board, allowing them to dry before judging of the tints. He will understand one colour may be put over another without the under one showing through. If he wants his colours to be their full depth of tint he must mix them with the size-water only, and the part on which these colours are to be put must be previously distempered white. I should be pleased to contribute a pattern or any further information to "R. C. H.," or any one with the same worthy object in view as that of decorating his church.

F. R. M.

LIFE IN LIVERPOOL.

SINCE the publication of my former letter in your journal, the mortality in this town of Liverpool has increased from the then rate of 33·5 to 36·4 per 1,000, and this, too, although the heat of the weather had very sensibly diminished. The deaths have actually exceeded the births by thirty—one-tenth of the whole number nearly. How is this? Compare it with London. In London, in the same period, the deaths, according to the Registrar-General's return, were 24 per 1,000, and the births have exceeded the deaths by more than one-third of the whole number. This comparison is very damaging to Liverpool.

I have endeavoured in my former letter to point out two of the causes of this fearful state of things, and as since then I have suffered severely in my own health and in that of my wife and children, it is with all the greater reason I feel the necessity of some alteration.

The existence of the large number of middens in the town is undoubtedly the cause of a great deal of disease and death. I have endeavoured to ascertain why these places exist, and I am told that there is an overwhelming interest in the town-council which prevents their conversion into closets. The sanitary reformers were strong enough some time ago to carry a law compelling the builders of all new houses to provide water-closets to them; but all then-existing middens are still emptied by nightmen, and the contents carted into the country for farm manure. And it sometimes happens that the removal to the country does not take place at once. It is always carried out and deposited on the pavement, ready to be put into carts; but the carts do not always come, and the filth remains till the next night, and perhaps till the morning following. I enclose an instance of this. The effect is most sickening. I can account for its continuance only by saying, as I believe, that the great bulk of the people here are excessively ignorant of the first principles of sanitary science.

With regard to the second cause I mentioned, the drinking customs of the inhabitants, I shall quote a few figures. I believe the population of Liverpool is something over half a million. These are supplied with intoxicating drinks from 2,500 licensed houses, or one house to about 200 persons, men, women, and children. To show that these houses are used I shall quote the records of Monday last, 17th inst., which say that there were no fewer than 278 persons in custody, 53 of these charged with felony, and the remainder with assaults and with being drunk and disorderly. And this, recollect, is for Liverpool only, and does not include Birkenhead. Is any comment necessary?

I have heard and read in newspapers that there was free trade in intoxicating liquors in Liverpool,—that licences were granted to any person who had the required accommodation. That, however, is not the case now, though it may have been so formerly. An instance of this has occurred within my own knowledge lately in which the owner of a corner house in a great thoroughfare has had it fitted up in a most expensive manner for the retail spirit, wine, and beer trade. He has been refused a spirit licence, and his house is now open as a wine and beer shop only.

Sir, it appears to me conclusive that a great number of people here die of poison. The system is poisoned by the immoderate use of bad liquor, and they live and sleep in crowded neighbourhoods, where each house has a midden seething and fuming in its rear, giving off poisonous gases, which, acting on the already weakened system, produce some kind of zymotic disease. This again is fed by more liquor taken as a remedy, which goes on till a doctor is called in, who generally finds the disease has reached a stage beyond his control.

And I say crowded neighbourhoods advisedly, for there are districts in Liverpool which beat London hollow in that respect, and which, if the law were properly carried out, would not exist.

There is one other circumstance which appears to me to be at least a proximate cause of mortality. I mean the existence of numerous burial societies.

These societies undertake to pay a certain sum at death, say 6*l*., on condition that a weekly subscription of, say 2d., be made to them. And they are very considerate, for they will not trouble you to bring them the money, but they employ collectors to call on the members for their twopences, which they do with a regularity which reminds a Londoner of the tallyman; and, indeed, his business partakes somewhat of that character, for he is paid usually by a percentage of some 25 per cent. on what he collects. And as these men pass from house to house, and find one recently come to be inhabited, they call and introduce themselves with, "Would you like to join the ——— Burial Society, sir?" Such a circumstance is within my own experience. And this applies to every member of the family, though only a day old.

Imagine the effect produced by the regular appearance of this collector upon the members of a family, especially if they be poor and ignorant, as is often the case. They would be forcibly reminded of death every time he called. For what reason does he come but that he may receive a small payment which is to secure a large sum to them at the death of one of their number? And it is within my own knowledge that parents whose natural feelings have been blunted by drink, and want, and care, have ceased to provide wholesome sustenance for their children when well, and proper nourishment and nursing when they fell sick, and have come to look upon the death of one of their children as a blessing, as a means whereby their empty pockets may

be filled; a means perfectly legal because the law seldom reaches them, and they know others do the same. Is it not notorious that, high and low, children are looked upon as a nuisance; and that, while the rich succeed in preventing them coming into the world, the poor, less skilfully, succeed in sending them out of it? Otherwise, how is it that 103 children, under five years of age, have died of diarrhœa in one week in this town? I would not have it supposed that I object to the principle of life-assurance; but assuredly it should be confined to the bread-winners of the family. Wherever else it is applied, it offers a direct premium on death, which abundant evidence proves is in these days not neglected. E. G.

PROTECTION OF BRICK WALLS FROM RAIN.

A CORRESPONDENT, "M.," writes thus:—

"In answer to 'Utilitarian's' letter in your impression of the 29th ult., requesting information as to the best method of preventing damp driving through brick walls in exposed situations, I beg to inform him that the best remedy he can have is the patent solution manufactured by Messrs. R. Gay & Co., of Alton, Hants, which I find answers the purpose admirably, and renders walls quite impervious to moisture, whilst the composition itself is not affected by extreme heat or cold."

We know nothing of the merits of this solution, and we leave our usual course in thus advertising it. The writer of the note, however, holds a public appointment, and may be supposed to speak what he knows. The evil in question is so large and universal, the request for a remedy so constant, that we shall be glad of confirmatory evidence if the solution be tried. Also, to know whether or not it is applicable to stone walls.

VALUE OF LAND AT MARGATE.

A CORRESPONDENT writes,—The corporation of Margate bought, on a late occasion, an old tumble-down property known as "Pott's Property," in King-street, with a view to widen the thoroughfare. They gave 630*l.* for the land, some 40 ft. square, inclusive of the two old shops thereupon, and have again sold the site by public auction, one condition of the sale being that the purchaser should pull down and clear the existing houses by the 31st December next, and give up a strip of the entire frontage, 8 ft. wide at one end, and 5 ft. wide at the other, for the purpose mentioned. The result of the sale shows that the Town Council estimate the value, and pay for the land they thus obtain for street improvements, at a figure seemingly out of all proportion to the demands of the borough, or to the wealth of the ratepayers.

The case may be stated thus:—The council pay for the entire property 630*l.*, and sell off the unrequired portion for 370*l.*; thus paying for the widening of the street 260*l.*

Now the piece or strip of land thus obtained for the widening of the street at a cost of 260*l.*, is equal to 221 square feet, and so costs about 50,820*l.* per acre. Verily, there must be more money than land at Margate.

"A DRUIDICAL RACE IN INDIA."

SIR,—Under this title the attention of the public is drawn, for the first time, as it is imagined, to the fact, adduced by Dr. Hooker in his address to the British Association at Norwich, that there is a race in India who still practise observances such as have been usually attributed in this country to the Druids. In 1864, however, a singular fact of this very kind was first brought under general notice by me in the *Builder*, with reference to the religious observances of an Indian tribe inhabiting the Sub-Himalayas.

Dr. Hooker, in his address, thus speaks of the Druid-like structures which he has seen in India:—

"It will no doubt surprise many here to be told that there exists within 300 miles of the British capital of India a tribe of semi-savages who habitually erect dolmens, menarес, cysts, and cromlechs, almost as gigantic in their proportions and very similar in appearance and construction to the so-called Druidical remains of Western Europe; and what is still more curious, though described and figured nearly a quarter of a century ago by Colonel Yule, the eminent Oriental geographer, they are scarcely alluded to in the modern literature of pre-historic monuments, except by Sir J. Lubbock. In the Bengal *Asiatic Journal* for 1844 you will find Colonel Yule's description of the Khasia people of East Bengal, an Indo-Chinese race. Dr. Thomson and I dwelt for some months among the Khasia people, now eighteen years ago, and found Colonel Yule's account to be correct in all particulars. The undulatory eminences of the country, some 4,000 *ft. to* 6,000 *ft. above the level of the sea*, are dotted with groups of huge unpolished squared pillars, and tabular slabs, supported on three or four rude piers. In one spot, buried in a sandgrove, we found a nearly complete circle of menhirs, the tallest of which was 30 ft. out of the ground, 6 feet broad, and 2 ft. 8 in. thick; and in front of each was a dolmen or cromlech of proportionately gigantic pieces of rock, while the largest slab hitherto measured is 32 ft. high, 15 ft. broad, and 2 ft. thick. Several that we saw had been very recently erected, and we were informed that every year some are put up, but not in the rainy season, which we spent in the country. The method of removing the blocks is by cutting grooves, along which fires are lit, and into which, when heated, cold water is run, which causes the rock to fissure along the groove: the lever and rope are the only mechanical aids used in transporting and erecting the blocks. The objects of their erection are various,—sepulture,—marking spots where public events had occurred, &c. It is a curious fact that the Khasian word for a stone,—'man,' as commonly occurs in the names of their villages and places, as that of man, maen, and men does in those of Brittany, Wales, Cornwall, &c.: thus mansmai signifies in Khasia the stone of oath; mamloo, the stone of salt; manflong, the grassy stone; and just as in Wales per mœn maur signifies the hill of the big stone; and in Brittany a menhyr is a standing stone; and a dolmen, a table-stone, &c. The establishment of a British cantonment among them renders it important that the inquiry into their origin, language, beliefs, customs, &c., should be followed up without delay. This will now be done, thanks to your representations, and I cannot doubt but that it will throw great light upon that obscure and important branch of prehistoric archæology, the megalithian monuments of Western Europe."

The passage in the *Builder* of 1864, to which I have referred, is as follows:—

"Oracles are even now (or were lately) in full force in the Sub-Himalayas. In the *Asiatic Journal* of Bengal, vol. xviii. p. 730, is a curious account, by Mr. B. H. Hodgson, of an 'incantation,' as he calls it, named the bamboo festival of the Bodos, which was then still actually *ordered*, annually, by the Rajah of Sikkim, for the purpose of predicting the prospects of the harvest! In this modern incantation, thirteen priests (a devil's dozen) dance and chant with a monotonous invocation of a few brief syllables and chorus, round another—a central priest,—called the Deoda, in whom the God or the Oracle is to be manifested. Each of the thirteen holds a bamboo pole in his hand. The chant and whirling dance gradually become fast and furious, till, suddenly, all the thirteen poles *are concentrated to the one common centre of the circle*, into a *pavilion* form, above the head of the central Deoda, who immediately goes off in what Mr. Hodgson calls an 'affected fit,' but which a little more knowledge of what he was speaking of would have, no doubt, induced him to think was probably a real fit—of entrancement, during the continuance of which the Oracle,—the God-possessed or God-given man, the Deoda,—in the encircled centre, was doubtless consulted by the surrounding priests. Even to the 'pavilion' there is, in all this, something peculiarly and impressively *Druidical*."

The quotation occurs in a letter "On circular Rock-marks and other Symbols" in the *Builder* of 2nd July, 1864. JOHN E. DOVE.

OVERCROWDING IN NEW YORK.

A RESIDENT thus writes of the dwellings inhabited by the poor in the more unhealthy parts of New York:—

"The ordinary way in which tenement houses in New York are built is as follows: 'A lot' is 25 ft. by 100 ft., and on this are erected two buildings, seven or eight stories high—one at the front of the lot and one at the rear—each 25 ft. by 40 ft., and separated by a court 20 ft. wide. Through each house, in the centre, runs a hall 3 ft. wide, and the space on each side of this, which is 40 ft. by 11 ft., is divided into four rooms, each 10 ft. by 11 ft. The room which fronts the street and the one which looks into the court have windows; the two middle rooms are lighted and ventilated only by the door which opens into the hall. Thus, upon this lot of 25 ft. by 100 ft. are crowded 128 apartments; and in each of these generally dwells a family, although in some cases one family contrives to pay for two rooms, in one of which the cooking, washing, and eating are done, while the other is the sleeping apartment. The rooms are about 7 ft. high, and to get fresh air into them or foul air out of them is impossible. It is only in the best of these houses that one family has even one room to itself. In many of them, two and sometimes three families occupy the same den, and occasionally take 'boarders' besides: so that in a single house of this size 800 men, women, and children eat and sleep. As misery loves company, the greater number of these fearful places are crowded together in the same quarter of the city; and in the same localities are hundreds of slaughter-houses, stables, tanneries, soap factories, and all sorts of similar nuisances, continually poisoning the air with the most noisome vapours. The moral influences of these neighbourhoods are as bad as their material surroundings, and here are the vilest brothels, the lowest shebeens, and the most beastly dance-houses. In the Fourth Ward of New York, a locality where a large amount of mercantile and manufacturing business is done, the population is crowded into the worst kind of 'tenement' houses, and an examination made of 300 of them showed that the inmates had only about 100 cubic feet of air-space for each individual, when 700 ft. is the least quantity in which a person can exist without detriment to his health. The inevitable consequences follow. All sorts of zymotic diseases prevail in these quarters: the children die off with fearful rapidity; and the death-rate is often as high as 1 in 20, while in other portions of the city it is as low as 1 in 60. There is one curious fact which I have observed in my wanderings through the quarters of which I have spoken. I did not find any Scottish people there, and on consulting the police and Board of Health records, I saw that while every other nationality under heaven was to be found in the Fourth and Sixth Wards, there was scarcely a Scotsman there, unless he was conducting some business as an agent. I found one item in my researches giving the census of 50 tenement houses inhabited by 382 families. There were 2 Welsh people, 7 Portuguese, 9 English, 10 Americans, 12 French, 39 Africans, 186 Italians, 189 Poles, 218 Germans, and 812 Irish. And these figures give a pretty good idea of all that part of New York which lies between the Battery and Canal street, and from which the heaviest Democratic majorities are given."

INTERCOLONIAL SOCIETY.

SIR,—A daily contemporary, in a recent leading article, announces "that there had been held, with little parade or ostentation, the first meeting of the above-named society, which is intended to supply a conspicuous want in our colonial system, and that its aims are so eminently useful that the wonder is they were not attained long ago."

In reference to this subject, will you kindly allow me space in your valuable periodical to record that, some five years since, I felt the need of a society having for its objects the establishment of an Intercolonial Club-house, in some central position, say the banks of the Thames, where colonists might rendezvous and enjoy a temporary home, which should combine not only dormitories, but a museum for the exposition of specimens of colonial products, natural and artificial, as well as a repository for records of colonial statistics, books, maps, &c., either for reference or purchase; thus centralizing the vast colonial interests of the empire upon the same principle that now leads to the centralization of the Government departments and of the Courts of Law.

Entertaining these views I committed them to writing, and had printed copies circulated among colonists, including ex-colonial governors, but they were so lukewarm in the matter that I suffered it to drop; the revival, however, of the project under the favourable circumstances narrated is most gratifying. W. N. CRAUFORD.

PUBLIC BUILDINGS AND DISTRICT SURVEYORS.

AT the Marylebone Police Court, on the 27th ult., Mr. D'Eyncourt was engaged for several hours in hearing a case, the decision of which affects three theatres now erecting in London.

The "Marylebone" theatre in New Church-street, Edgware-road, is now undergoing alterations prior to its being re-opened as the "Royal Alfred." Mr. Peebles, the district surveyor of the northern division of Marylebone, acting under the provisions of the Metropolitan Building Act, visited the premises, and noticing that the builder, Mr. Samuel Simpson, did not carry out the works in accordance, as the surveyor thought, with the rules laid down in the Act of Parliament, he gave him notice of the alterations and additions which he required to be made. The builder paid no attention, nor did he appeal to the Metropolitan Board, but, according to the district surveyor's evidence, he proceeded with the work with extra speed. Under these circumstances the district surveyor took out a summons against the builder under the Building Act, for that he "did do certain things contrary to certain rules of the said Act; to wit, did construct the floors of corridors leading to the boxes upon the first gallery, and also the floor at back of said gallery, with combustible materials; and did omit to do certain things required to be done by the said Act; to wit, to construct the said floors with stone or other fire-proof material as required by sec. 22."

In the course of a long discussion as to what was meant by the term "corridor," and a reference to dictionaries on the subject, the case was simplified by the defendant stating that he had not obeyed the notice from the district surveyor for several reasons. The following are some of them:—

1st. The theatre was not essentially different from what it had been before the alteration, except that new material was used, the old having become so rotten that it was unlikely that the Lord Chamberlain would re-license the theatre unless it were removed. The interior arrangements of the former theatre having been approved by the Chamberlain, all that was necessary for him was to get the Chamberlain's licence again. In cross-examination he said that the stage had been shortened, and the auditorium thereby enlarged. Under the new management the theatre would hold about 200 more persons. Mr. D'Eyncourt said he was strongly of opinion that the Lord Chamberlain's licence did not apply to the question as to the materials to be used in the construction of a theatre. Defendant said it did. For instance, if he deposited plans approved of by the district surveyor, but which did not meet with the approval of the Chamberlain, he (the builder) would have to alter those plans before he could get a licence. Mr. D'Eyncourt asked to be shown any section which exempted theatres from the operations of the Metropolis Building Act. Plaintiff said there was no exemption for theatres.

2nd. Defendant said he had built the Queen's and Holborn theatres, and there were surveyors in those districts as well as in Marylebone. They had not objected to the mode in which those buildings had been constructed, though it was precisely the same as in the present case. He was also building the Gaiety Theatre, and no difficulty was made by the district surveyor there. Mr. D'Eyncourt observed that one object contemplated by the Act was the safety of the public during fire; and to say that Mr. Peebles ought not to take certain action because two other district surveyors had not thought proper to do so, was no proof that Mr. Peebles was wrong.

3rd. Defendant said the plans were approved of by the official at the Metropolitan Board who acted on behalf of the superintending architect; but it was contended by plaintiff that this was not an approval by the Metropolitan Board, who were not now sitting.

Mr. D'Eyncourt said that he considered this to be a new building, and that it came under the operation of the Building Act. He believed plaintiff had made out his case, and the necessary alterations must be made in accordance with the district surveyor's notice.

CHURCH-BUILDING NEWS.

Barnet.—Trinity Church, Barnet, has been consecrated. It was opened so long ago as the beginning of 1865 under license. The church was erected from the designs of Mr. Ewan Christian, and consists of a nave, north and south aisles, and apsidal chancel, with aisles; the southern aisle, which is used for the organ, has the vestry behind. The walls throughout are of brick, with stone dressings. The nave roof is ceiled with a barrel vault, with moulded ribs, tie-beams, and king-posts. In the aisles the whole of the timbers are exposed to view, and stained and varnished. The roof of the chancel is similar to that of the nave, both being adapted for decoration. The roofs externally are covered with slate; and the bell-cot, which is constructed of timber in connexion with the chancel arch, is covered with oak shingles, and is surmounted by a vane. The interior is fitted with open benches of stained deal, affording accommodation for about 420 persons. The passages generally are paved with red and black quarry tiles, and the floors of the chancel and communion space are laid with Minton's tiles—the latter being of encaustic patterns. Messrs. Dove, Brothers, were the builders, and the amount paid for their work was 2,996*l.* 4*s.* 6*d.*

Stroud.—The new church at Stroud has been opened for divine service. Various plans for the restoration were, we believe, obtained; and, among others, Mr. Gilbert Scott sent in a design. Ultimately, Messrs. Wilson & Wilcox, of London and Bath, were appointed the architects, and Messrs. Wall & Hook, of Brimscomb, the builders. Under their direction the old church, excepting the tower and spire, was razed to the ground. Of the 7,000*l.* required when the stone was laid, more than 5,000*l.* had been promised: the general subscriptions realised about 4,000*l.*, and the remainder came from the Warneford Trustees, the Stroud Feoffees, the Diocesan Society, and the Incorporated Society. Save in regard to the spire, the rebuilding has been complete. The new building is cruciform, and comprises nave, north and south aisles, north and south transepts, chancel, north and south chancel aisles, south porch, and vestry on the south side of the chancel aisle. The tower and spire are at the west end of the nave, and the belfry is divided from the nave by an open iron screen. There are eight bells. The chief entrances are through the south porch and under the tower: there are also entrances on the east side of the north transept and through the vestry. The length of the nave is 77 ft.; its width, 23 ft. 3 in.; and its height from the floor to the wall-plate, 33 ft.; and to the apex of the roof, 48 ft. The north and south aisles are, of course, the same length: the north aisle is 18 ft. 3 in. wide; the south, 16 ft.; and the height is—to the wall-plate, 19 ft.; and to the apex of the roof, 32 ft. The north and south transepts are 22 ft. long and 19 ft. wide: the height of the side walls is 26 ft.; that to the apex of the roof, 42 ft. The length of the chancel is 29 ft.; the breadth, 23 ft. 3 in.; and the height—to the cornice, 26 ft.; and to the apex of the roof, 43 ft. The chancel aisles are 28 ft. long; the width of the north aisle is 18 ft. 3 in.; that of the south, 16 ft.; and the height of the wall is 18 ft.; and that to the apex of the roof, 31 ft. The nave is divided from its aisles by an arcade of five arches on each side. The columns are of blue Bristol Pennant stone, with carved Painswick stone capitals, from which the arches rise. The arches are also executed in Painswick stone, with moulded heads. There are twelve clearstory windows on each side, and they have blue Pennant columns, with moulded and carved caps, to correspond with those of the arcading below. The roof of the nave is of English oak. The whole of the roofs are circular-headed. Underneath the tiles is a layer of Croggon's patent asphalt. The nave aisles are lighted—the north aisle with four two-light windows in the north wall, and one three-light window at the west end; the south with three two-light windows in the south wall, and one three-light window at the west end. The north and south transepts have each a large four-light window in the gables, and also a three-light window in the east and west walls, all with moulded jambs and traceried heads. The north and south chancel aisles are divided from the chancel by two arches on each side, supported by moulded Painswick stone bases, beneath four cluster.d red Devonshire marble columns for each centre, and two for each respond. From the carved capitals spring the arches, which are deeply moulded, with red Mansfield stone bands. These aisles have each a three-light window at the east end. Between the nave and the chancel is a moulded and carved arch, springing from carved corbels, on which stand black polished Devonshire marble columns. The east window has five lights, with deeply-moulded jambs and traceried heads. Between the chancel and its aisles, and also between it and the nave, are low Painswick-stone screens. The floor of the chancel is laid with Godwin's figured encaustic tiles; the floors of the nave and aisles and transepts and tower and porch are of Godwin's plain red tiles. The outer walls are faced with Painswick stone ashlar. The walls are built in diagonal-range stonework, pointed with dark mortar. The external dressings are of Bradford-on-Avon stone, obtained from the quarries of Rogers & Rollins. The entrance porch has a deeply-moulded arch, supported by blue Pennant stone columns, supplied by Mr. F. Greenway, of Downend, near Bristol, who also furnished the large columns of the interior arcading. The roofs are covered with Broseley coloured tiles, laid in alternate courses. The material employed throughout is chiefly native stone, and the architecture is Early Gothic, of thirteenth century. Save for those we shall mention presently, the windows are filled with cathedral-glass in tinted patterns. All the internal fittings are of English oak, and have been twice varnished. The oak sittings are open. They will accommodate about 1,200 persons. The painted windows are seven in number. One in the tower, by Ward & Hughes, represents Christ Blessing Little Children, and the cost of it has been collected by children of the town. The chancel-window, by Heaton, Butler, & Bayne, has five large lights, four of them with double subjects, representing the Annunciation, Visit of the Wise Men, the Appearance of the Angels, the Flight into Egypt, the Addressing of the Disciples, the Crucifixion (the large centre light), the Resurrection, the Ascension, and other incidents in the Saviour's life; and the tracery is filled with flowers and emblematical devices. The south chancel-aisle window has three lights, illustrating the Parable of the Talents, by Lavers & Barraud, and given by Mrs. Charles Stanton. The north transept window is given by Mr. Sidney Biddell and family, and chiefly illustrates Christ rewarding the just. In the tracery are angels and praying children bearing scrolls. The south-transept window contains large figures of the Evangelists. The window in the north aisle is given by Mrs. Cubitt, and that in the south aisle by Mrs. Hill, of the Thrupp.

Tickhill.—The Parish Church of Tickhill, after being restored and cleansed, has been re-opened for divine worship. The entire cleansing and restoration of the church was done by Mr. Athron, of Doncaster. The first week's work, which consisted in scraping off a thick enamel of whitewash was performed freely by a number of men in the village, and in three months the work was completed, the whole interior presenting a renovated appearance. Such of the windows and pillars as needed it were restored, and the walls, &c., cleansed and stuccoed. A new reredos, designed by Mr. Goddard, of Lincoln, and constructed of stone, alabaster, and slate, was placed in the chancel. By the liberality of Mr. B. H. Brooksbank, the organ, which entirely hid the west window, was rebuilt and removed to the Laughton Chapel. The restoration of this instrument was done by Mr. Meacock, of Doncaster. The front pipes have been decorated by Mr. J. Hawley.

DISSENTING CHURCH-BUILDING NEWS.

Ashbourne, Derbyshire.—The chapel of the Countess of Huntingdon's connexion at this place, is about to be restored and enlarged, and the schools rebuilt. Messrs. Stonier Brothers, of Rocester, have contracted for the works, which are to be carried out under the direction of Mr. Sugden, architect, of Leek.

Barrow-in-Furness.—A Presbyterian church, costing some 1,400*l.*, and calculated to hold 350 persons, has been formally opened. The Messrs. Hay, of Liverpool, were the architects.

Plymouth.—A Presbyterian church has been commenced here, which will accommodate 1,200 persons. The architect, Mr. J. L. Hodge, of Plymouth, has designed the building in the Italian style of architecture, and it will be of limestone, obtained from Pomphlete and the West Hoe Quarries, faced with Portland stone. It will be 100 ft. by 55 ft., and about 50 ft. high, lighted by thirty-seven windows, and there will also be a gallery. The estimated cost is 4,000*l.*, of which one-half has been contributed. Mr. Walter Lethbridge is the contractor, and is getting on with the work. The foundation-stone has just been laid.

Brighton.—A new church, unconnected with the Established Church, has been opened here for divine service by Dr. Cumming. It is constructed of iron, upon the plans and under the superintendence of Messrs. Hemming, of London, and is said to be, with one exception—that of a church at Cheltenham, built by the same firm—the largest iron structure of the kind in the kingdom. It provides for and accommodates a congregation of 1,500 persons; and on the occasion of its opening contrived to include within its walls some 150 more. The church is situated at the west side of Brighton, between the Western-road and the sea, close to Waterloo-street. It is Gothic in its general style and formation, with a centre aisle and two side aisles, standing east and west, with an eastern chancel, in which is placed the communion-table. It is highly decorated: recourse has been largely had to both strong colours and gilding. It is thickly carpeted in addition throughout, and the open pews are cushioned in scarlet.

Knighton. — The new Wesleyan Chapel, at Cefninion, in the Knighton circuit, the foundation-stone of which was laid in April, has been dedicated to divine worship. The edifice was built by Mr. Pugh, of Bishop's Castle. It is in the Norman style of architecture.

Whitby.—A new Congregational Church, at West Cliffe, Whitby, has been opened for divine worship. The edifice was designed by Mr. J. P. Pritchett, of Darlington, and is in the Geometrical style. It consists of nave and aisles. Accommodation is provided for 950 adults on the ground floor and galleries, in seats which are open and have low slanting backs, all of pitch pine, varnished. The contracts amounted to 3,300*l.*, exclusive of warming apparatus, gas-fittings, and furnishing, which, with professional charges and sundries, will bring up the total to about 4,000*l.*

SCHOOL-BUILDING NEWS.

Worcester.—The new building for Queen Elizabeth's Grammar School has been formally opened. It is situated in the Tything, to which it presents its chief elevation. An unsightly row of cottages has been removed to make way for the new building. The material is Tewkesbury brick, with Bath stone facings and dressings, and the style is Elizabethan. There are on the west side, facing the street, three three-light square-headed windows, and a large five-light pointed window at the north and south ends. These windows have stone mullions and transoms. Above each window is an ornamental square and circular step gable, with a ventilating slit or opening in each; and the steeply-pitched roof is surmounted in the centre by an octagonal lantern-light or bell-turret, covered with lead, which also acts as a ventilator; a crown and weather-vane on its top. In a niche, canopied, over the central window of the front, is a statue of Queen Elizabeth, designed by Mr. Perkins, the architect, and executed by Mr. Boulton. The statue represents her Majesty crowned and holding the sceptre and orb. The porch by which the school is entered is at the north-west angle, and is composed of variegated bricks and free-stone, and over the door is an ornamental gable containing a sculptured shield with the royal arms, and the initials "E. R." (Elizabeth Regina). The floor of the porch is covered with Godwin's encaustic tiles. The great school-room, which is about 44 ft. in height to the apex of the roof, 50 ft. long, and 27 ft. 6 in. wide, has an open roof, hammer-beamed, resting on stone corbels. This room is lined with white bricks, varied with red and black, has a boarded floor, is warmed by a large open fireplace, and is provided with a clock. At the north end of the school a passage leads into a class-room, also into lavatories, robing-rooms, hat and cloak rooms, waterclosets, urinals, &c., the offices of the masters being distinct from those of the boys; and at the rear are coal stores, with two fives courts and playground. The school and grounds are surrounded by a high fence, that of the front towards the street and sides being an ornamental railing, with stone piers. Between the front railing and the façade of the school is a distance of 27 ft., consisting of a gravel walk, with either turf or flower-

border. The entire cost will be about 1,600*l.* The architect was Mr. Perkins, and the builders were Messrs. Collins & Cullis, of Tewkesbury.

Darlaston.—The first stone of new schools intended to be erected in connexion with the parish church of St. Lawrence, Darlaston, has been laid by Mrs. S. Mills, of Darlaston House. The design is Gothic. The building will be 130 ft. in length and 68 ft. in width, and designed to accommodate 500 children, and will stand upon 2,040 square yards of land, valued at 306*l.*, the gift of Mr. J. A. Dorsett, of Woodville, Bromsgrove. It is estimated to cost 2,430*l.* The architect is Mr. A. P. Brevitt, jun., and the builder Mr. J. Wilkes, both of Darlaston.

Hurstpierpoint.—The first stone of new parish schools has been laid. The schools, of which Messrs. Goulty & Gibbins are the architects, are to be a Gothic building of red brick, and will comprise boys' and girls' schools, each 46 ft. by 17 ft.; and infant school, 45 ft. by 17 ft.; and a master's house. The building is to cost 1,867*l.* Mr. F. Hollands is the builder employed.

Miscellanea.

CRANE ACCIDENT IN MANCHESTER.—An accident, unfortunately attended with loss of life, has occurred at the works of Messrs. Bowden & Edwards, builders, Brook-street, Manchester. The owners were fixing a large boiler, weighing 7 tons, by means of two travelling cranes, calculated to move respectively 8 and 4 tons. Fourteen men were engaged in the work; and just as they were putting the boiler in its place, and when it was raised 3 ft. from the ground, the gangtree broke which supported the two cranes, and they both fell, breaking into several pieces. Seven of the men were knocked down and severely injured. One of them died on the way to the infirmary. The larger crane was a new one, but the smaller one had been in use fourteen or fifteen years, and the woodwork was much decayed, which was the cause of the accident.

THE BIRMINGHAM WORKHOUSE SCHOOLS.—The Birmingham guardians are again in a difficulty about the workhouse schools. The Poor Law Board decline to sanction the plans lately adopted, unless with modifications so extensive as greatly to enhance the cost. The guardians will not agree to some of these modifications. Neither do they revert to their original resolution to build completely separate schools, and so leave the workhouse free to its proper inmates, at the same time giving the children the means of escape from the miserable influences of pauper association. All the objections of the Poor Law Board, as the local journal notes, tend in this direction; and perhaps the Poor Law Board may ultimately insist upon the original plans being carried out. It would be cheaper in the end, as well as more beneficial to the children.

A STEEP RAILWAY.—A somewhat strange account of the railway to the summit of Mount Washington, New Hampshire, has reached this country. The station, at the starting-point, is 2,700 ft. above the level of the sea; and the road, when complete, will be two miles and 260 rods long, rising, it is said, in that instance, 3,600 ft. to the Tip-Top House, which is 6,300 ft. above the level of the sea. The average grade of the track is 1,280 ft. to the mile, but in some parts of the line the grade is increased to 1,760 ft. to the mile, or 1 ft. in every 3 ft. On this portion of the road the workmen, notwithstanding the sharp spikes in their shoes to prevent them from falling, could only build 25 ft. per day. The track consists of three rails, the one in the middle being of wrought iron, with cogs or pins corresponding to cogs in the driving-wheel. The train consists of the locomotive with a tender and one passenger car. The locomotive of 35-horse power is built with its boiler suspended, so that it is always level; it weighs four tons, and pushes the train up before it. The driving-wheel is 18 in. in diameter. There is a similar cog-wheel on the tender, and another on the passenger-car, each strong enough to hold the entire train. Friction rollers, running under the edges of the middle rail, hold the train down upon the track. The ascent from the starting point to the second station, 5,300 ft. above the level of the sea, was accomplished in one hour and twenty minutes, including two stoppages for water. The descent occupied thirty-eight minutes.

ST. STEPHEN'S, WALBROOK.—We are asked in more than one quarter to call public attention to a contemplated alteration in the position of the organ here, calculated some say, who know exactly what is proposed, to damage materially the effect of the interior as well as of the organ. The *Musical Standard* says the alteration will be a perfectly useless and wanton architectural innovation.

THE NEW CHANNEL DOCKS, BRISTOL.—There has been commenced at Avonmouth an undertaking which, it is hoped, will greatly benefit the trade and add to the prosperity of the city of Bristol; namely, Channel docks, for the accommodation of ocean-going steamers. The present docks are only calculated for vessels of moderate tonnage. The dock and adjoining premises are to occupy 70 acres of land. The dock is to be 1,400 ft. long by 500 ft. wide, and the lake will cover an area of 16 acres. The lock will admit any vessel second to the *Great Eastern*, being 450 ft. in length by 85 ft. in width. The vessels, having taken their berths, will have facilities for discharging their cargoes into warehouses or railway trucks. There is to be a tramway which will connect the docks with the Port and Pier Railway, and an important feature of the undertaking is the Junction Railway, extending from the present line to the three great local railways. Mr. Lawrence has the contract.

CURIOUS IDENTIFICATION OF STOLEN TOOLS.—At the Llanelly Petty Sessions a mason, living at Swansea, was charged by a carpenter, of the Bres, Llanelly, with having stolen some of his tools. Prisoner had in his possession a rule, which was one of the articles named previously as having been stolen. A small brass plate, about three-eighths of an inch wide, was let into the rule which prisoner had in his possession, upon which the owner's name had been engraved. Other articles answering to the description given by the owner were found in the prisoner's possession, except that they were not stamped with his name as described. It was found on examination that names had been scraped or cut out of the various articles, and on the exact places at which prosecutor said they had been stamped. Captain Cross, the magistrate, suggested that if the tools were dipped in boiling water the names would become quite intelligible again. The experiment was tried, and on each article, says our authority, the *Cambrian*, the name of the prosecutor, exactly corresponding with the stamp he produced, became readable. The prisoner was committed for trial. The curious fact here so ingeniously made use of reminds one of the puzzling Chinese mystery of silver plate which shows on one side what is chased or otherwise represented on the other.

ALTERATIONS AT CARLISLE GAOL.—The alterations of Carlisle gaol, in accordance with the requirements of the Prisons Act, are making rapid progress. There are 112 cells for males, arranged in two rows and in three stories. All the doors on each flat open into long corridors, which in the case of the upper stories are narrow galleries, so that the whole building is open from floor to roof with the galleries of the first and second floors projecting on each side. The cells are all flagged and have arched roofs. In the day time each cell is lighted by a square window strongly grated and guarded, and at night it is so illuminated by gas that the lighting apparatus is beyond the control of the prisoner. A cavity is made in the wall near each door, in which the gas-light will be placed. The inner side will be fitted with plate-glass, and on the outer side will be placed a good reflector to throw forward and diffuse the light in the cell. The water supply, like the gas, is also beyond the control of the prisoner. A brass water-nozzle will project into each cell, and at a certain hour, at which the water will be turned on, the gong will sound for washing. The prisoner must then draw his supply. At certain times, too, the supply for drinking will be turned on. In a cupboard will be conveniences, including a utensil upon the earth-closet principle, which has been substituted for the more costly system of water-closets for night use. The cost of water-closets as at first planned in each cell would have been about ten guineas each; whereas the whole of the furniture, under the plan adopted, will not, it is expected, cost more than 2*l.* for each cell. Whether the one be as good as the other is another question. The whole building will be heated with Gill's stoves, and preparations are now being made for laying the flues.

THE ASSOCIATED CARPENTERS AND JOINERS OF SCOTLAND.—The sixth annual demonstration of this association has taken place at Edinburgh, in the Corn Exchange, Grassmarket. When all had assembled the large building was completely filled, upwards of 3,000 being present—the excursionists having been joined by about 800 of the trade from Edinburgh and Leith. The addresses were chiefly on the advantages of social gatherings amongst the working classes, and advocated the cause of union, not for the purpose of aggression, but for the maintenance of rights.

DAMAGES FOR POLLUTION OF A STREAM.—In the case, Scarisbrick *v.* Ormskirk Local Board of Health, the plaintiff, Lady Scarisbrick, owner of extensive estates in the neighbourhood of Ormskirk, sought to recover damages from the Board of Health of Ormskirk for causing a nuisance by polluting a stream which, running through a portion of the plaintiff's property, communicates with the lake in Scarisbrick Park. A verdict for 1,000*l.* was taken by consent, to be reduced to the nominal sum of 40*s.* if the nuisance complained of was abated. There were several other terms agreed to.

LAKE DWELLINGS IN SCOTLAND.—Interesting researches have been recently made on the Loch of Forfar. The existence of a crannog or lake dwelling on this lake has long been known, but its thorough examination has only now been made. The causeway was found to consist of a ridge of stones and marl, stretching across to the west end of the loch. On the north side there had been a row of piles, on the top of which were transverse piles, generally about 5 ft. below the surface of the ground. The examination led to the inference that the inhabitants were similar in their modes of life to those who erected the lake-dwellings in Switzerland.

BURIED ALIVE IN LAMBETH.—The Lambeth Waterworks Company have lately opened a trench at Surbiton, for the purpose of laying down a 30-inch service-pipe. Several workmen were engaged, and as they progressed the trench was filled in. The works were carried on under the contract of Messrs. Aird & Son, and the superintendence of an engineer of the water company's selection, and an inspector provided by the contractor. The works had reached Maple-road, nearly opposite the Antelope Tavern, when there was a slip of earth, entirely burying a man named Dymond, and partially covering up two others, one of whom was embedded to his middle. Dymond was extricated alive, and taken to the Westminster Hospital, where he afterwards died. The men at work complained amongst themselves that the struts and shoring were insufficient, as it was light earth, the opening having been previously made for a similar purpose. They, however, made no formal complaint. An inquest was held upon Dymond, and the jury found a verdict of "Accidental death," but requested Mr. Trotman, the manager under the contractor, to act with greater care for the future. Mr. Trotman said the request of the jury was almost unnecessary, for great care was taken, but for the future the shoring and timber work should be particularly attended to.

DISCOVERY OF A ROMAN OVEN AT WINTERTON.—An interesting antiquarian discovery has been made in digging for sand, about half a mile west of the Roman road at Winterton, in a field about half a mile east of the Roman tesselated pavements. By the falling of a portion of the side of the pit there was exposed what appears to be a rudely-constructed oven, made by sinking a circular cavity, about 6 ft. deep and 6 ft. diameter at the top, becoming narrower towards the bottom, so as to be, in fact, an inverted cone. From the centre of the floor rises a pillar, 1 ft. 9 in. in height, and widening from 1 ft. diameter at the bottom to 1 ft. 10 in. at the top, which pillar widens suddenly so as to form a sort of mushroom-head, continuous in structure with the clay or mud floor and walls just described. A shallow groove runs all round the inside of the oven, a little above the top of the pillar, and broken pieces of blue Roman pottery are laid across from the pillar to the side of the basin, so as to cover in a sort of circular flue. Over these has been spread a thin coat of clay, similar to the rest of the lining, so that the upper story, so to speak, is a shallow pit, about 3½ ft. diameter and 1½ ft. deep. It may be that this was used for baking bread or other cooking operations, and that it was heated by a fire in the flue beneath. This upper part was filled with earth, plaster, broken Roman pottery, &c., and the flue with black ashes and Roman potsherds.

FIRES IN LONDON.—Within forty-eight hours last week no fewer than twelve fires took place in the London district. How much longer shall we build houses as if expressly to burn?

CO-OPERATIVE CONGRESS.—At a meeting held at the offices of the Agricultural and Horticultural Association, to determine the time and place for holding a congress of the representatives of co-operative societies, partnerships of industry, trade unions, &c., it was resolved that the meeting shall take place in London, in the early part of February, 1869. Resolutions were passed to the effect that invitations be issued to co-operative societies, at home and abroad, and the friends of the movement generally, and a list of questions for discussions by the congress was drawn up.

EGRESS FROM OVERTURNED RAILWAY-CARRIAGES.—A proposal has been revived that there should be openings or hatchways in the roofs of railway-carriages, so that if overturned the passengers could readily get out by opening these hatchways or roof-doors. The difficulty of keeping out rain would be an objection: however watertight such hatchways might be when made, they would be liable to become defective. It is difficult to keep even skylights watertight. Perhaps a lining of elastic indiarubber along the edge of the hatchway pressing on the roof-edge where they met might aid in keeping the whole watertight, the overlapping and all other arrangements being as carefully planned as possible.

BALANCE WEIGHT SIGNALS.—Mr. F. N. Gisborne proposes to apply his ship and mine signals to hotels, hospitals, and houses. The principle is simple. The apparatus consists essentially of a balance-chain, working around indented pulleys, each pulley being placed in the centre of a dial, and furnished with an index, the connexion being so made that neither of the pointers can move without all the others adopting a precisely similar course. In the mining signals the dial is lettered "men," "up," "stop," "down," "men," respectively, and whenever either one of the pointers is directed to say "up" the engine-room bell gives the proper signal, and every pointer in the connexion is at the same instant turned to "up" also—in fact, the dials may be lettered to suit any kind of wording that may be considered necessary. As the weights at either end exactly balance each other, the index has no tendency to return to any zero, but remains at whatever point it may be set. The apparatus is self-adjusting, and transmits signals steadily, but little power being required to move it. The pointers and transmitting handles of every communicator and indicator can be quickly adjusted to the centre of a common order by simply turning the outside binding screw, which holds them in position. Any ordinary mechanic can fit it; and the cost price is said to be small, and the fitting inexpensive. Mr. Jerram, of Great Queen-street, Westminster, engineer, has undertaken the introduction of the mining signals.

BRADFORD BYE-LAWS AND TOWN IMPROVEMENTS.—Mr. Dewhurst, one of the borough magistrates of Bradford, is erecting an arcaded market for the benefit of a district where such a market is needed; and the corporation, who have an interest in putting down all markets but their own, have been attempting to stop the erection of the new market by various dodges, under pretence of the plans being inconsistent with the bye-laws. Six successive plans were prepared by the architects, Messrs. Lockwood & Mawson, but each time the requirements were only extended, — as, for example, in regard to the breadth of the street, and the arcading. One bye-law stated that "Every new street, not being a carriage-road, shall be laid out and formed at least 24 ft. wide, and *there shall be one entrance*, at least, to every such street, of the full width thereof, and *open from the ground upwards*." As to the breadth of the street, the local Board, in the face of their own bye-law insisted, successively, on 36 ft., and even 42 ft., to which the plans were actually altered. Mr. Dewhurst being advised that "open from the ground" in the bye-law as it stood referred to the entrance and not to the street; and, being prepared with the evidence of various architects and others to the effect that ventilation, drainage, width, &c., were adequately provided for, at last proceeded with his market in defiance of the corporation, who cited him before the local magistrates; but they have just dismissed the case, after full and repeated hearing.

A ROMAN CATHOLIC CHURCH is about to be erected in York-road, Battersea. It is to be of brick, with windows and other dressings of moulded brick, in the style of the thirteenth century. Mr. Charles A. Buckler is the architect, and Mr. B. E. Nightingale is the contractor.

ISLINGTON NEW WORKHOUSE.—At the last meeting of the Islington Board of Guardians, some strange statements were made as to improper materials and proceedings in erecting the new workhouse, and by a series of resolutions the clerk of the works was placed in a wrong position in respect of the architect. The contractors should be either exonerated from the charges made, or requested to walk off the ground at once.

THE COLOSSEUM IN THE REGENT'S PARK.—It would be a matter for regret if the Colosseum were pulled down. Can nothing be done to prevent this? London is greatly in need of large and appropriate halls and meeting-places. It seems a pity to sacrifice a fine building of its kind easily convertible for such a purpose. A correspondent, Mr. Roumieu, suggests that it should be made to take the specimens of Architecture and Sculpture of the British Museum, but we are not quite prepared to adopt this suggestion.

TECHNICAL INSTRUCTION FOR WORKMEN.—The Working Men's Club and Institute Union have obtained the authority of the Science and Art Department to engage the services of Mr. J. C. Buckmaster for the purpose of holding a series of meetings at the different workmen's clubs in London, at which he will explain the conditions under which the Department grants aid in the formation of science classes. The first of these meetings was held on the 25th ult., at the club called "The Bedford Institute," for workmen, in Wheeler-street, Spitalfields. Mr. Buckmaster gave a very clear statement of the great facilities afforded by the Department for the establishment of such classes. Those present were evidently not aware of the very small outlay necessary to provide systematic instruction in such subjects as applied mechanics, mathematics, machine-drawing, geometry, chemistry, &c., or of the valuable rewards given for proficiency.

THE MASTERS AND WORKMEN ACT.—An important case under the Masters and Workmen Act of 1867 was heard recently at the county magistrates' office in Liverpool. Messrs. J. G. & Robert Martin, builders, complained by information that two hod-carriers, named Stephen Wood and James Dignan, whom they had employed at 22s. per week, had struck work about one o'clock on Thursday, the 20th August, at some houses in course of erection in Edge-lane, and so brought to a stand the bricklayers engaged in building the houses. The bench ordered the prisoners to pay respectively 8s. and 7s. as their share of the loss thus sustained by their employers, in having to pay men who were standing idle—trade rules not allowing any one but recognised hod-carriers to carry bricks to the "setters"—and to forfeit half their week's wages. The judgment was designated a lenient one for the sake of example, and to show workmen the power of the new Act in compelling them to fulfil their labour contract.

TRAMWAY RAILS.—A report from the Liverpool borough engineer to the Health Committee of the town council, on models of sections of the rails proposed to be laid down by the Tramway Company, has been made. The reporter describes the crescent rail and the corrugated rail. A crescent rail was laid in Castle-street, and remained there nearly two years. This rail was only 3 in. wide, and was not considered to be of the best form to insure safety and prevent obstruction. The corrugated rail was then submitted to the committee. This rail was also only 3 in. wide, and was consequently deficient in stability. It was, however, a decided improvement on the crescent rail, and the engineer recommends it on condition that it be broadened to 4 in.; and the top of the groove eased by being rounded, so as to prevent its becoming dangerous to horses. This rail, if thus altered, he considers, would be superior to any yet in use. It is 1 in. wider than that submitted to and approved of by Parliament. The object of the increase in width is to admit of the use of sleepers strong enough for stability and for the security of the rail fastenings, and to be so covered by the rail that the paving may abut closely upon it on each side.

LIVERPOOL SEWAGE UTILIZATION COMPANY.—At the half-yearly meeting, held in the Townhall, Liverpool, Mr. Robert Neilson presiding, the report stated that the requisite amount of subscriptions for the work had been paid; that arrangements had been made at Blundellsands, north of Liverpool, for arable and other land on which to apply the sewage; that a contract had been entered into by Mr. Daglish for the supply of steam pumping apparatus capable of lifting 500,000 gallons per day; and that plans had been adopted for the construction of the intercepting sewer. The report was adopted.

TENDERS.

For rebuilding warehouse, Bury-street, St. Mary-axe. Mr. H. H. Collins, architect:—

King & Sons	£1,015 0 0
Henshaw	942 0 0
Dawes	880 0 0
Wall & Russell	822 0 0
Stuart & Bennett	670 0 0

For pair of villa residences at Ealing, for Mr. Bowden. Mr. Marks, architect:—

Keeble	£2,179 0 0
Foxley	2,100 0 0
Hyde	2,085 10 0

For completing four houses in Nutfield-road, East Dulwich, for Mr. Manning. Mr. Edgar Aldous, architect. Quantities not supplied:—

Ring (accepted)	£355 0 0

For completing a pair of houses at Croydon, for Miss Banks. Mr. Edgar Aldous, architect. Quantities supplied by the architect:—

Dennis (accepted)	£485 0 0

For roads and sewers on the estate of the Land Company of London, Limited, at Shootup-hill-lane, Hampstead. Mr. H. G. Haywood, surveyor. Quantities supplied:—

Ennor	£3,915 0 0
Mowlem & Co.	3,714 0 0
Hill, Keddell, & Waldram	3,707 0 0
Nicholson	3,470 0 0
Pound	3,410 0 0
Blomfield	3,145 0 0
Clark	3,097 0 0
Porter (accepted)	2,700 0 0

For the erection of a detached residence at Faversham, Kent, for Mr. J. A. Anderson. Mr. B. Adkins, architect, Quantities not supplied:—

Whiting	£2,280 0 0
Sollitt (accepted)	2,075 0 0
Shrubsole (withdrawn)	1,998 0 0

For a pair of semi-detached residences at Hounslow, for Mr. Cooper. Quantities not supplied:—

Phillips	£883 0 0
Nias	878 0 0
Hanson	860 0 0

For pulling down and rebuilding shop and warehouses for Mr. J. B. Hopkins, Angel-street, Cardiff. Mr. J. Hartland, architect. Quantities supplied:—

Price	£960 0 0
Michelmore	949 0 0
Shepton	940 0 0
Jones, Bros.	890 0 0
Lock	889 0 0
Seager	850 0 0

For additional factories in Lower Kennington-lane, for the Patent Silvering Company, Limited. Mr. A. Nickerson, architect:—

Ellis	£1,800 0 0
Clemence	1,644 0 0
Henshaw	1,618 0 0
Newman & Mann	1,550 0 0
Macey (accepted)	1,477 0 0

For first portion of new buildings and alterations to Paddington Workhouse. Mr. Thos. R. Parker, architect. Quantities supplied:—

Adamson	£4,386 0 0
Lovett	4,280 0 0
Wigmore	4,130 0 0
Temple & Forster	4,100 0 0
Nutt & Co.	4,100 0 0
Butt & Son	4,060 0 0
Crockett	4,036 0 0
Till	3,947 0 0
Lee & Gregory	3,892 0 0
Elbs & Son	3,892 0 0
Wicks & Bangs	3,887 0 0
Mann	3,795 0 0
Higgs	3,774 0 0
Cooper & Cullum	3,590 0 0
Merrit & Ashby	3,535 0 0
Palmer	3,500 0 0
Foale	3,440 0 0

For Caterham Asylum. Messrs. John Giles & Biven, architects:—

Wigmore	£95,000 0 0
Webster	95,000 0 0
Webb & Sons	92,804 0 0
Myers & Sons	92,700 0 0
Hill, Keddell, & Waldram	90,765 0 0
Pollard	89,895 0 0
Kirk	89,753 0 0
Blackmore & Morley	89,500 0 0
Anscombe	89,200 0 0
Fuller & Longley	89,139 0 0
Ryder & Son	88,119 0 0
Gammon & Sons	87,887 0 0
Kirk & Parry	87,500 0 0
Howard	85,900 0 0
Chappell	83,677 0 0
Shearburn	81,729 0 0
Knight	79,645 0 0

For building stables, &c., at Wellington-villas, Brighton, for Mr. H. Tester. Quantities supplied. Messrs. Goulty & Gibbins, architects:—

Cheeseman	£504	0	0
Hall	497	0	0
Nash	471	0	0
Lockyer (accepted)	440	0	0

For paving and burning for Irrigation Works, for Harrow Local Board of Health. Mr. A. H. Jacob, engineer:—

	Per Acre.		
Wright & Co.	£20	0	0
Mold	12	17	6
Anres	12	0	0
Reeves & Smith	9	0	0
Pearson	8	0	0
Lovett	6	15	0
Parker	6	14	8
Randall	6	5	0
Leach	6	0	0
Lawrence	5	18	0
Jewell & Co.	5	0	0
Hill	5	0	0
Sheer	4	17	6
Bean	4	15	0
Jarman	4	10	0
Barnes, Hassall, & Co. (accepted)	3	13	4

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